Title	Modelling childhood antecedents of anomalous experiences and beliefs : fantasy proneness, hypnagogic/hypnopompic and sleep experiences
Author	Sherwood, Simon John
Qualification	PhD
Year	2001

Digitisation Notes:

- Page numbers 12, 24, 48, 124, 316 & 380 are omitted from pagination
- The first survey is unnumbered

Modelling Childhood Antecedents of Anomalous Experiences and Beliefs: Fantasy Proneness, Hypnagogic/Hypnopompic and Sleep Experiences

Simon John Sherwood

Doctor of Philosophy

The University of Edinburgh

2000

Dedication

I would like to dedicate this thesis to my nan, Ronnie Brown.

She was always very proud of me but sadly died in December 1998 and did not live to see me complete my work.

Acknowledgements

Thanks to my family, particularly my dad and Maureen, my mum and my great aunts Ann and Ada (thanks for all the chocolate biscuits), for their support. I would also like to acknowledge the financial support received from the ESRC that made this research possible.

Academically, I am grateful to my supervisor Professor Bob Morris for being a great role model and for his great sense of humour; thanks also to my other supervisor, Dr. Caroline Watt, for her rapid and honest feedback, her great eye for detail and her great parties. I am also grateful to Dr. Paul Stevens and Zachary McDermott for their assistance and advice on computer issues and for being good flatmates. Thanks also to Dr. Tony Lawrence for sowing the seed for some of my research ideas and especially for his advice regarding SEM. I am grateful also to various members of the PA and the SPR who have offered me useful feedback and words of encouragement on a number of occasions.

Thanks to everyone within the Koestler Parapsychology Unit who were always fun to work and play with. Special thanks to Drs. Fiona Steinkamp and Julie Milton for being good neighbours.

Thanks also to Ogmundur and Tim, my friends and fellow PhD students, for the regular games of squash and beers during my time in Edinburgh. Thanks also to folks at University College Northampton (especially Dr. Chris Roe and Jacqui, Rose Capdevila and Sarah Brown) who have helped me to settle in, thus enabling me to get the writing finished more quickly! Thanks to Professor Deborah Delanoy for her support and encouragement. Thanks also to Christine Simmonds, Nicola Holt (and their friend Tony) and David Luke for making me smile.

Thanks also to my own childhood black dog experience that stimulated my interest in parapsychology. And finally, thanks (and apologies) to those of you that I ought to have mentioned but have not…

Declaration

This thesis is submitted for a Doctor of Philosophy degree at the University of Edinburgh. I declare that this thesis, and the research that has contributed to it, is my own work.

Signed:

Publications and Conference Presentations

The following papers have come out of work done as part of this thesis:

Sherwood, S. J. (in press). An examination of the relationship between the hypnagogic/hypnopompic states and reports of out-of-the-body experiences. To be published in an edited book produced by the Parapsychology Foundation.

Sherwood, S. J. (in press). A comparison of the features of the psychomanteum and hypnagogic/hypnopompic experiences. *International Journal of Parapsychology*.

Sherwood, S. J. (in press). Relationship between childhood hypnagogic/hypnopompic and sleep experiences, childhood fantasy proneness, and anomalous experiences and beliefs: An exploratory WWW survey. *Journal of the American Society for Psychical Research*.

Sherwood, S. J. (2000). A comparison of the features of the psychomanteum and hypnagogic/hypnopompic experiences. *Proceedings of the Parapsychological Association 43rd Annual Convention*, 262-275.

Sherwood, S. J. (1998). Relationship between the hypnagogic/hypnopompic states and reports of anomalous experiences. *Proceedings of the Parapsychological Association 41st Annual Convention*, 210-225.

Sherwood, S. J. (1997). Relationship between childhood hypnagogic/hypnopompic experiences, childhood fantasy proneness and anomalous experiences and beliefs: An exploratory WWW survey. *Proceedings of the Parapsychological Association 40th Annual Convention held in conjunction with The Society for Psychical Research*, 370-386.

The following papers came out of research conducted alongside my PhD research with colleagues at the University of Edinburgh.

Sherwood, S. J., Dalton, K., Steinkamp, F., & Watt, C. (2000). Dream clairvoyance study II using dynamic video-clips: Investigation of consensus voting judging procedures and target emotionality. *Dreaming*, *10*, 221-236.

Dalton, K., Steinkamp, F., & Sherwood, S. J. (in press). A dream GESP experiment using dynamic targets and consensus vote. *Journal of the American Society for Psychical Research.*

Sherwood, S. J., Dalton, K., Steinkamp, F., & Watt, C. (1998, September). *Dream GESP study II using dynamic video-clips: investigation of consensus voting judging procedures and target emotionality*. Paper presented at the 22nd International Conference of the Society for Psychical Research, York, England.

Sherwood, S. J., Dalton, K., Steinkamp, F., & Watt, C. (1998). Dream GESP study II using dynamic video-clips: investigation of consensus voting judging procedures and target emotionality. *Proceedings of the Parapsychological Association 41st Annual Convention*, 226-241.

Dalton, K., Steinkamp, F., & Sherwood, S. J. (1996). A dream GESP experiment using dynamic targets and consensus vote. *Proceedings of the Parapsychological Association 39th Annual Convention*, 57-72.

Dalton, K., Steinkamp, F., & Sherwood, S. J. (1996, August/September). *A dream GESP experiment using dynamic targets and consensus vote*. Paper presented at the 20th International Conference of the Society for Psychical Research, Cirencester, England.

Table of Contents

List of Tables

Traditional pencil-and-paper survey data

List of Figures

Traditional pencil-and-paper survey data

Abstract

Cross-sectional surveys of adult participants (conducted via the WWW and via the traditional pencil-and-paper technique) plus structural equation modelling techniques were used to test competing models, based upon those of Irwin (1992, 1993a) and Lawrence (1998), in order to establish whether anomalous beliefs should best be modelled as an outcome of anomalous experiences (experiential source, ES, model), as an antecedent of anomalous experiences (cognitive source, CS, model), or whether the relationship is reciprocal (reciprocal causation, RC, model). Irwin and Lawrence disagree about the nature of this relationship; Irwin considers it to be reciprocal but Lawrence favours the experiential source explanation.

Irwin's and Lawrence's models both postulate that fantasy proneness is a positive predictor of anomalous experiences which in turn are a positive predictor of the level of anomalous beliefs. It has been suggested that fantasy proneness characteristics might be conducive to the operation of genuine anomalous processes and/or that they might lead to the misinterpretation of normal experiences. A second aim of this thesis was to establish whether, in addition to childhood fantasy proneness, the childhood incidence of hypnagogic/hypnopompic (HG/HP) and sleep-related experiences can also predict measures of the frequency of anomalous experiences throughout one's lifetime. Reasons for the inclusion of these additional variables were (1) Wilson and Barber's (1983) finding that people with fantasy-prone personalities often report HG/HP imagery, many since childhood, as well as a range of anomalous experiences, (2) Wilson and Barber suspected that such experiences are closely tied to reports of anomalous experiences, and (3) that the HG/HP and sleep states are often associated with reports of anomalous experiences and beliefs.

A final aim of this thesis was to compare the results of survey data collected electronically via the WWW with that collected via traditional pencil-and-paper methods to see whether the data collection method affected the results.

Two world-wide web (WWW) surveys (involving 108 and 130 adults, respectively) found that the level of childhood fantasy proneness and the incidences of a number of childhood HG/HP and sleep experiences had significant positive correlations with measures of childhood and adulthood anomalous experiences. The incidences of childhood and adulthood anomalous experiences were also significantly positively correlated with the current level of anomalous beliefs. These results provided some preliminary support for the paths in the proposed models. A further non-WWW version of the survey, with more traditional pencil and paper completion of the same questionnaire by a sample consisting mainly of university college staff and students (N=139), was also conducted.

Intercorrelations within and between the childhood incidences of the hypnagogic/hypnopompic and sleep-related experiences suggested possible underlying factors. Subsequent factor analyses of the WWW and traditional pencil-and-paper survey data identified and confirmed three factors (HG/HP experiences, dream experiences, sleep disorder symptoms) within the sleep-related items and two factors (non-UFO-related, UFO-related) within both the anomalous experiences and beliefs measures.

These findings were incorporated into revised models that proposed that these childhood factors, plus fantasy proneness, would be significantly intercorrelated and that each would also be a significant positive predictor of global measures of anomalous experiences. The models also proposed that the anomalous experience measures would be significant predictors of the levels of their respective beliefs.

SEM analyses of data from both the WWW and the traditional pencil-and-paper surveys found that revised versions of the ES, CS and RC models provided a good fit to the data, although the RC model was considered to be the best of those tested for both empirical and theoretical reasons. These findings support Irwin's rather than Lawrence's model of the childhood antecedents of anomalous experiences and beliefs.

The SEM analyses also suggested that, as Lawrence has argued, fantasy proneness is best modelled as only having an indirect relationship with anomalous beliefs via its relationship with measures of anomalous experiences. This finding does not support Irwin (1992, 1993a) who argues for an additional direct relationship between fantasy proneness and measures of anomalous beliefs. However, although these models fit the data, childhood fantasy proneness is not a significant positive predictor of measures of anomalous experiences when the effects of other predictors in the model are taken into account. Measures of childhood HG/HP experiences, in particular, and also sleep disorder symptoms were found to be significant positive predictors of the measure of non-UFO-related anomalous experiences.

The measures of childhood fantasy proneness, HG/HP experiences, dream experiences and sleep disorder symptoms, as predicted, were found to be significantly correlated. This suggests that these people may have a tendency to experience imagery and an enhanced capacity to enter and become absorbed in altered states of consciousness (ASCs) and to be able to recall associated experiences. This thesis has also noted that this provides some support for the concepts of transliminality (Thalbourne & Delin, 1994) and boundary structure (Hartmann, 1991).

This thesis has also discussed evidence that the HG/HP and sleep states might be conducive to anomalous processes or the misinterpretation of normal sleep-related experiences. Evidence which suggests that temporal lobe brain activity might play a role in the production of both normal sleep-related experiences and anomalous experiences and that such experiences might also be the result of interactions with the earth's geomagnetic field was also discussed. It is argued that the notion of temporal lobe lability (Neppe, 1990; Persinger, 1989) and intercalation of the hemispheres also fit in with the theories behind transliminality and boundary structure.

The finding that the factor structure of the measures and the fit of the models and the proportion of variance accounted for were all generally replicated across two samples of data collected via WWW and traditional pencil-and-paper survey techniques suggests that the validity of the results is not adversely affected by the use of the WWW. It is argued that the differences in the descriptive statistics associated with the measures for the two samples are likely to be due to differences in the heterogeneity and demographics of the samples. The limitations of the SEM findings and the survey methodology were also discussed.

Overview & rationale

Surveys have found that many people claim to have experienced, and an even greater proportion believe in, a variety of anomalous phenomena, such as extrasensory perception (ESP), psychokinesis (PK), ghosts, out-of-the-body experiences (OBEs), communication with the dead and so on (see reviews by Irwin, 1993a, 1994c; also, Gallup & Newport, 1991; Grimmer & White, 1990; Haraldsson, 1985; Haraldsson & Houtkooper, 1991; McClenon, 1994a; Palmer, 1979). From a psychological perspective, it is important to establish whether or not these experiences are caused by processes that are beyond our current scientific understanding and, if so, how they operate and also their limitations. If such experiences are not genuine, then it is important to establish what causes people to make such misattributions. In some cases, experiences that are perceived to be beyond our current understanding can be a source of anxiety or distress; in these and other cases, those involved may be keen to find out more information and possible explanations for their experiences and may seek professional advice, e.g., from medical practitioners and psychologists. We need a better understanding of the mechanisms underlying these reports and the effects that they can have if we are to be able to provide the necessary information and support. It is hoped that this thesis will contribute to this understanding, particularly as far as reports of anomalous sleep-related experiences are concerned.

The aforementioned experiences and beliefs are often described as being 'paranormal' or 'parapsychological'. Broadly speaking, these terms tend to refer to phenomena whose explanations appear to be beyond our current scientific understanding. However, there are a variety of views, held by researchers and the general public, regarding the meaning of these terms and the criteria which determine the kinds of experiences/phenomena that should be subsumed by them (see Chapter 1). In this thesis measures of 'anomalous' experience and beliefs will be taken. The term 'anomalous' is preferred because it is more neutral and because it allows the inclusion of additional phenomena, such as UFOs, which are not considered by most researchers to be within the scope of parapsychology but which are often reported around the time of sleep. The sleep state and the borderline states that surround it, i.e., the hypnagogic and hypnopompic states, have been associated with reports of a variety of anomalous experiences and there is evidence to suggest that they might be conducive to the operation of genuine anomalous processes but also that features of these states might lead to misinterpretations of normal sleep-related experiences (see Chapter 5). Note that this thesis will not be attempting to test for evidence of genuine anomalous processes.

Regardless of whether or not genuine paranormal processes do exist, there has been increasing interest in the characteristics of people who believe that genuine anomalous processes are involved with these kinds of phenomena and also in what causes people to develop such beliefs (see review by Irwin, 1993a).

Although very few surveys have directly asked people what factors have influenced their beliefs (except Blackmore, 1984; Clarke, 1995, for example), it is clear that both internal and external/social factors seem to be involved. Naturally, psychological research has tended to focus on the internal factors. Personal experience is the reason for holding anomalous beliefs that is most often cited in the literature (e.g., Blackmore, 1984; Clarke, 1995; Milton, 1992; Roe, 1998; Schmeidler, 1985; Zusne & Jones, 1989); individual characteristics are also considered to be important.

Researchers have investigated a whole range of potential correlates of paranormal beliefs, such as demographic, attitudinal, cognitive and personality factors (see Chapter 2). As we shall see later, fantasy proneness appears to be a particularly important correlate as it has been consistently related to a variety of anomalous beliefs and experiences, unlike most of the other correlates (see Irwin, 1993a). Much of this research has been survey-based and cross-sectional in design and has suffered from a lack of theory or guiding principles. Such a lack of theory and explanation has also been one of the major criticisms of parapsychological research in general. Although many theories have been proposed (Chari, 1977; Irwin, 1999; Radin, 1996; Stokes, 1987) to account for a variety of paranormal phenomena, few can be said to be well-known and none are generally accepted.

In my opinion, there are a number of problems with previous research into the correlates of paranormal belief. Firstly, much of the research has only looked for a series of bivariate relationships between variables and this obviously does not take into account other variables that might also be influential. As Zusne and Jones (1989) also noted, "many of the variables that correlate with belief in the paranormal are themselves correlated, so that it is difficult to determine which is responsible for the basic relationship." This problem can be addressed by the use of multivariate analysis, which can also minimise the number of tests that need to be conducted (Tabachnik & Fidell, 1996). Secondly, the cross-sectional nature of many of the surveys makes it difficult to predict the direction of the relationships (if they are indeed causal) and to establish how relationships might change over time. For example, one important question to consider is the nature of the relationship between anomalous experience and beliefs; does experience cause changes in belief, does belief cause a greater frequency of anomalous experiences and/or reports thereof, or do both variables affect each other? Thirdly, this issue highlights another problem with correlational data; one cannot establish causality from correlational data alone. An experimental approach would be the best way of establishing a causal relationship between two or more variables but it is somewhat difficult to use this method when investigating anomalous experiences and beliefs. A final criticism of previous research into the correlates of paranormal beliefs is that, although there have been some hypotheses and common trends regarding research in this area (see review by Irwin, 1993a), there has been very little attempt to develop models and theories to explain how and why these various correlates are related to paranormal beliefs (Lawrence, 1998).

However, recently, researchers, such as Irwin (1992, 1993a) and Lawrence (1998; Lawrence, Edwards, Barraclough, Church, & Heatherington, 1995), whose work was based upon Irwin's, have begun to take stock of the research to date and have begun to develop models that attempt to predict and explain the relationships between some of these correlates (see Chapter 3). Both Irwin and Lawrence have begun to focus on the developmental process and both have devised models that include childhood antecedents of paranormal experiences and beliefs (Irwin, 1992, 1993a; Lawrence, 1998; Lawrence et al., 1995). Within both of these researchers' models, fantasy proneness (Wilson & Barber, 1983) is a key variable.

Fantasy-proneness is a personality construct that was identified as a result of interviews with a group of women who responded extremely well to hypnotic suggestion (Wilson & Barber, 1983). Although such fantasy prone personalities are fairly rare, many people share some of the fantasy prone characteristics. Fantasy prone individuals typically demonstrate high imaginative ability, a tendency to become absorbed in real and imagined events (which can occasionally lead to difficulties with reality distinction). They also report frequent hypnagogic/hypnopompic imagery, a vivid recall of personal experiences, and physical concomitants associated with memories and fantasies (e.g., Lynn & Rhue, 1988; Rhue & Lynn, 1991; Wilson & Barber, 1983). Of particular interest is that people with fantasy prone characteristics often report a whole range of anomalous experiences (e.g., Alvarado & Zingrone, 1994; Council & Huff, 1990; Wilson & Barber, 1983) and beliefs (Allison, 1996; Council & Huff, 1990; Irwin, 1990, 1991a; Lawrence et al., 1995; Lawrence, 1998). There are at least two, not necessarily mutually exclusive explanations for this relationship. Perhaps their ability to enter, become absorbed in and recall experiences from the hypnagogic/hypnopompic states facilitates the operation, recognition and/or recall of anomalous processes or agencies. Alternatively, perhaps these abilities, coupled with a tendency to fantasise plus the occasional difficulties experienced in distinguishing reality from imagination, lead to the invention of reports of anomalous experiences or the misinterpretation of normal (imaginary) experiences.

The relationship between fantasy proneness and paranormal beliefs

Although both Irwin and Lawrence agree that fantasy proneness is an important contributing factor to the development of paranormal beliefs, they disagree as to whether fantasy proneness can have a direct effect on paranormal belief. Irwin (1993a) proposes that, in addition to an indirect relationship via paranormal experience, fantasy proneness can lead directly to the development of paranormal beliefs because the latter can provide a sense of control over one's environment, though he does not really explain how such beliefs are developed. Lawrence (1998; Lawrence et al., 1995) proposes that fantasy proneness causes a person to report more paranormal experiences and that these experiences cause a person to develop or strengthen their paranormal beliefs. Lawrence (1998) found that tests of a simplified version of Irwin's model, which contained the aforementioned direct and indirect paths between fantasy proneness and paranormal beliefs, did not fit the data in two out of three samples but a version of the model without the direct path provided a good fit with all three samples.

The relationship between paranormal experiences and paranormal beliefs

Irwin and Lawrence also disagree about the nature of the relationship between experience and beliefs; Irwin considers the relationship to be reciprocal whereas Lawrence considers experience to be the cause of belief (Irwin, 1992, 1993a; Lawrence, 1998; Lawrence et al., 1995). Irwin argues that paranormal beliefs can encourage the interpretation of unusual experiences as being paranormal and that experiences perceived to be paranormal can also strengthen paranormal beliefs. Lawrence found that a modified version of Irwin's model containing a path from paranormal experiences to paranormal beliefs provided a good fit to data from three separate samples. However, he did not test an alternative version containing a path from paranormal beliefs to paranormal experiences nor a version containing reciprocal paths.

The relationship between childhood sleep-related experiences and anomalous experiences

Apart from conducting surveys to test out and try to resolve Irwin's (1992, 1993a) and Lawrence's (1998; Lawrence et al., 1995) contrasting views of the nature of the relationship between fantasy proneness and measures of anomalous/paranormal experience and beliefs using structural equation modelling (SEM) techniques, this thesis also aims to test whether measures of the childhood incidence of hypnagogic/hypnopompic and sleep-related experiences will also be useful predictors of measures of anomalous experiences.

There are a number of reasons for including these additional variables: (1) in the original study by Wilson and Barber (1982, 1983), in which fantasy proneness was 'discovered,' it was noted that their fantasy-prone participants tended to report hypnagogic/hypnopompic imagery much more frequently than controls, and many had done so since childhood; (2) Wilson and Barber (1983) suspected that these hypnagogic/hypnopompic experiences might be closely tied to reports of paranormal experience and beliefs; (3) previous surveys (e.g., Gurney, Myers & Podmore, 1886; Rhine, 1981; Rose, Hogan, & Blackmore, 1997) and experimental work (e.g., Braud, 1977; Ullman & Krippner with Vaughan, 1989) have established that the hypnagogic/hypnopompic and sleep states are often associated with reports of anomalous experiences and beliefs.

These childhood variables are not already part of the models proposed by Irwin and Lawrence and may be able to explain some additional variance. The rationale is that people who report more of these childhood sleep-related experiences may be people who find it easier to enter, become absorbed in and recall sleep-related altered states of consciousness, including dissociated states that are a mixture of sleep and wakefulness. Perhaps this capacity increases the likelihood that they will recognise, recall and report genuine anomalous experiences, which are often associated with ASCs or perhaps the characteristics of the these sleep-related ASCs lead them to misinterpret normal experiences? The focus is on childhood sleep-related because childhood antecedents are the emphasis of Irwin's and Lawrence's models but also because such experiences are more common during childhood and they might have a greater impact on the reporting of anomalous experiences and the development of anomalous beliefs during this period. Also, if one excludes childhood variables then one might also exclude factors associated with the origins of beliefs. In summary, this thesis is proposing that, in addition to childhood fantasy proneness, models specifying that childhood sleep-related experiences will be positive predictors of a measure of anomalous experiences will provide a good fit to empirical data.

Structural equation modelling (SEM)

Further progress in the study of the development of paranormal beliefs has been made by Lawrence (1998; Lawrence et al., 1995) who has begun to use structural equation modelling (SEM) (Hoyle, 1995; Maruyama, 1998; Schumacker & Lomax, 1996) to analyse the structure of relationships between potential correlates of paranormal experience and beliefs. SEM is basically a statistical technique for testing whether a hypothesised model(s) of the linear relationships among a number of variables (either observed and/or latent) fits a sample of data to an acceptable extent. A model is simply a representation or description of the structure or system of relationships between the components.

One of the advantages of SEM is that one can take into account the influence of several predictors simultaneously rather than looking at a whole series of bivariate relationships and it allows for intercorrelations among predictors. Secondly, it is possible to test competing models using the same data in order to see which one fits the data best. Nevertheless, although a given model may fit the data, it is important to point out that there may be other models which might fit the data equally well (or perhaps even better) as there may be a potentially infinite number of possible models (Breckler, 1990; Bullock, Harlow, & Mulaik, 1994). Thus, the finding that a proposed model fits the data simply means that it provides a good description of the relationships among the variables (Bullock et al., 1994; MacCallum, 1995). Although SEM methods alone cannot establish causality, they do force the researcher to produce clear and precise models of the structure of the relationships. The results of testing various models can give useful suggestions regarding the plausibility of hypothesised causal relationships (Maruyama, 1998, pp.35) that can then be validated using other methods.

One of the disadvantages of multivariate techniques is that they generally require larger sample sizes than univariate techniques. With traditional survey data collection methods, gaining sufficiently large samples suitable for multivariate analysis can be problematic due to the difficulty of accessing a sufficiently large target population(s) and securing a sufficiently large number of responses.[1] The costs involved with the production, distribution and return of questionnaires can also be high.

World-wide web surveys

In order to circumvent some of the problems associated with the use of traditional postal pencil-and-paper survey methods in a multivariate context, this thesis aims to collect data via the relatively new medium of the world-wide web (WWW). The advantages of this are that there is ready access to a large population of potential respondents, the method provides a greater degree of anonymity for participants, there are savings in terms of research time and money, the data collection is relatively maintenance-free, data entry is carried out by the participant and is stored in electronic format ready for analysis, and the use of more dynamic techniques may increase participant motivation (Davis, 1999; Hewson, Laurent, & Vogel, 1996; Pettit, 1999; Reips, 1999; Schmidt, 1997). However, the potential disadvantages are that the participation requires access to and knowledge of how to use the internet, respondents tend to be self-selected, are members of a specific population and there are concerns over the validity and security of the results using this technique (Pettit, 1999; Reips, 1999; Schmidt, 1997) as opposed to more traditional pencil-and-paper methods. For example, there is evidence that computer anxiety can affect performance on computerised versions of some assessments (see Brosnan, 1999 for an overview). Unfortunately, WWW survey research is still in its infancy so there is very little psychological literature available on its use (Pettit, 1999). In order to address some of these concerns regarding the validity of the results, data collected via WWW surveys will be compared with that collected via the more traditional pencil-and-paper method.

[1] A typical response rate for a postal survey is 30% (Oppenheim, 1992).

Aims of the thesis

Cross-sectional surveys of adult participants (conducted via the WWW and via the traditional pencil-and-paper technique) plus structural equation modelling techniques will be used:

1. To test competing models, based upon those of Irwin (1992, 1993a) and Lawrence (1998; Lawrence et al., 1995), in order to establish whether anomalous beliefs should best be modelled as an outcome of anomalous experiences, as an antecedent of anomalous experiences, or whether the relationship is reciprocal.

2. To establish whether, in addition to childhood fantasy proneness, the childhood incidence of hypnagogic/hypnopompic and sleep-related experiences can predict measures of the frequency of anomalous experiences throughout one's lifetime.

Post hoc

3. To compare the results of survey data collected electronically via the WWW with that collected via traditional pencil-and-paper methods to see whether the data collection method may affect the results.

Chapter 1

An introduction to the terminology used in this thesis

Some of the terms used in this thesis may be unfamiliar to the reader or their meaning in this context may differ from the meaning in other contexts. In order to familiarise the reader and to try to ensure a shared understanding, this chapter will begin by considering what we mean by 'paranormal' or 'anomalous' and will describe some of the experiences/beliefs that are commonly associated with these terms.

Normal, abnormal and paranormal phenomena

Anecdotal evidence suggests that many people share a consensus regarding what is meant by the term 'paranormal' and which kinds of phenomena are associated with it. Terms that seem to be often used in relation to such phenomena, include, for example, 'paranormal,' 'parapsychological,' 'psychical,' 'anomalous,' 'anomalistic,' 'psi,' 'supernatural,' 'mystical,' 'occult,' and so on. However, unfortunately, many of these terms seem to have become synonymous to some extent. In my opinion, Braude's (1979) view of how people classify different phenomena seems to be quite apt:

> Most people operate with a rather vague, tripartite, pretheoretic distinction between ordinary phenomena, unusual or rare phenomena, and finally, phenomena (whether rare or not) that are downright weird, bizarre, or other-worldly. To some extent, this pre-theoretic distinction matches another distinction of interest to us—namely, the not-so-pre-theoretic distinction between *normal*, *abnormal*, and *paranormal* phenomena. (p.243).

In deciding whether something is paranormal, my feeling is that people do make judgements, albeit potentially erroneous ones, about the likelihood of an event occurring, whether such events are known about, and what the possible explanations for them might be.

One of the difficulties with research in this area is that lay perceptions of terms such as paranormal, and the phenomena associated with them, may differ from the (often-stricter) scientific definitions. This point is well-made by Irwin (1994a) who noted that:

> Again, there may be other phenomena interpreted as paranormal by the general public and yet excluded from study by parapsychologists. The considerable majority of scientific parapsychologists would not concede as legitimate issues in their field such things as witchcraft, popular astrology, fairies, the Bermuda triangle, numerology, and Tarot readings, despite the common image of these matters as paranormal in the mind of the public and indeed for many skeptics (e.g., see Frazier, 1981)...Regardless of the rationale for such demarcation of parapsychological endeavor, the fact remains that the average citizen's notion of paranormal phenomena is evidently far broader than that of the academic parapsychologist. (pp.5-6).

This makes things difficult for the researcher who is wanting to investigate this area of human experience; should one's definition and scope for these categories of experience/belief be guided entirely by one's scientific peers, should one be guided by the consensus of the general public to whom one is presumably wanting to generalise one's findings, or does one try to find some middle ground? If one takes a more academically-oriented position then this might be more clearly-defined and more exclusive but it might lack ecological validity; if one is guided by the lay views then there may be too much diversity and the boundaries may be too fuzzy. It is not until one actually stops to consider the terminology used to refer to these kinds of experiences and beliefs that the difficulty in determining strict defining criteria for inclusion becomes apparent.

We will begin by looking at the meaning of two of the most commonly used terms used to refer to these phenomena: 'paranormal' and 'parapsychological.' Before this can be done, it is necessary to consider what is meant by 'normal' and 'abnormal' phenomena. According to Braude's view, normal phenomena tend to be those that occur relatively frequently (ordinary) whereas abnormal phenomena tend to be relatively infrequent (unusual, rare) (Braude, 1979, p.245). A phenomenon may be considered to be extraordinary if its frequency deviates from a statistical norm or if it deviates from what is regarded as normal (Zusne & Jones, 1989, p.1). However, as Braude (1979) points out, "the class of abnormal phenomena is not the same as the class of unusual or infrequent phenomena, although these classes overlap." (p.243). With both normal and abnormal phenomena there tends to be a current understanding of the underlying cause and mechanism, although with abnormal phenomena it seems that their occurrence goes against what is usually expected to happen. Paranormal phenomena may or may not be relatively frequent but they differ from normal and abnormal phenomena in that they are inexplicable in terms of current understanding and are therefore negatively defined.

One definition of 'paranormal,' provided by Dale and White (1977, p. 929), that appears in a book entitled 'Handbook of Parapsychology' illustrates the point about synonymity:

> *Paranormal.* A synonym for psychic or parapsychological; beyond ("para") what should occur if only the known laws of cause and effect are operating.

Another definition also confirms the synonymity. This appears in 'A Glossary of Terms Used in Parapsychology' by Thalbourne (1982):

> **Paranormal** Term applied to any phenomena which in one or more respects exceeds the limits of what is deemed physically possible on current scientific assumptions; often used as a synonym for '*psychic*', '*parapsychological*', 'attributable to *psi*', or even 'miraculous' (though shorn of religious overtones). [fm. Gk. Para, 'beside', beyond', + normal] (p.50).

Both of these definitions imply that what is deemed to be paranormal at the present time may be deemed to be normal in the future if appropriate changes in scientific understanding have taken place (Braude, 1979; Radin, 1997, p.18).

Definitions of 'parapsychology' that have appeared in well-respected sources within the field include the following two examples: the first is taken from a Dale and White (1977) and the second is taken from the 1986 volume of the Journal of Parapsychology.

> *Parapsychology.* The branch of psychology which deals with behavior which cannot now be explained or described in terms of known physical principles; modern term for psychical research. (p. 929).

> PARAPSYCHOLOGY: The branch of science that deals with psi communication, i.e., behavioral or personal *exchanges* with the environment which are extrasensorimotor—not dependent on the senses and muscles.

These definitions, particularly the latter, associate these phenomena with an organism of some description. This raises the issue of whether parapsychological phenomena should be restricted to humans or whether other organisms may experience or may cause parapsychological phenomena too. Some writers (e.g. Irwin, 1994a; Lawrence, 1995a) believe that 'paranormal' and 'parapsychology' should refer to phenomena that relate only to human capabilities. Irwin (1994a) gives the following definition:

> *Parapsychology* is the scientific study of experiences which, if they are as they seem to be, are in principle outside the realm of human capabilities as presently conceived by conventional scientists. Thus parapsychological phenomena ostensibly indicate the operation of factors unknown to or unrecognized by orthodox science, so-called paranormal *factors*. (p.1).

So should 'parapsychological' exclude animals other than humans? There is certainly plenty of anecdotal evidence that suggests that other animals are believed to have paranormal experiences too. Some parapsychological research has also been carried out with animals and other organisms (e.g. bacteria, insects, fish, rodents, cats, dogs) (e.g., Braud, 1994; Davis, 1979; Morris, 1977; Sheldrake, 1994; Wiseman, Smith, & Milton, 1998) though their findings are equivocal.

Another point to note is that, if the definition of parapsychology is restricted to the study of (ostensible) paranormal phenomena that relate to human capabilities, then phenomena that may not require any agency as such (e.g., astrology, the Bermuda triangle) or that may involve non-human agencies (e.g., UFO's, angels, the Loch Ness monster) would be excluded. Although this is a tighter definition, it may lack ecological validity in that it may not fully take account of the domain of phenomena associated with the term by the general public.

In summary, what I am suggesting is that a number of different terms used to describe experiences or events that seem to be beyond current scientific understanding, such as 'paranormal', and 'parapsychological' have become synonymous in many people's minds even though closer scrutiny suggests that there are differences between them. The following section will consider possible alternative terminology.

Experience-focused versus explanation-focused terminology

To me at least, the terms 'paranormal' and 'parapsychology' seem often to be associated with an assumption that genuine paranormal or parapsychological processes actually exist. These terms also seem to refer more to the underlying explanations than to the phenomena/experiences themselves and thus can carry certain theoretical or explanatory baggage. In recent years, attempts have been made to use more neutral terminology which shifts the focus away from implicit assumptions about underlying explanations and towards the phenomena/experiences themselves (e.g., Irwin, 1994a; White, 1990). However, White (1990) warns of the possible dangers of using terms that are too simplistic; she says:

> It seems to me that if we hope to understand the phenomena of parapsychology, it is wrong to call them anomalous because that places them in a context devoid of meaning! When the practice was first adopted, I heralded it because we could think and talk about the phenomena without prejudicing their origins, but upon further reflection, I think that each experience, each significant finding, is an opportunity—a chance for *us* to speculate as to its meaning. (p.16).

I can see where White is coming from but I disagree with her. It is wrong to assume that anomalous experiences will always be meaningful for those concerned. People react in different ways; some may be indifferent, some may be slightly puzzled, others may find that their life and their worldview is changed as a result. Nevertheless the experience could still be considered anomalous. My opinion is that the experience should be separated from the meaning because the same phenomenology could be attributed different meanings by different people.

Other writers also dislike the use of the term 'anomalous'. Iping Petterson and Roll (1994) argue that:

> Furthermore, to call psychic occurrences and experiences *anomalous* is no improvement over calling them parapsychological. In science, *anomalous* is usually reserved for events and objects that do not fit any category and whose investigation is considered unlikely to lead to general principles or practical application. To call psychic occurrences anomalous is to suggest that they are marginal and will play no significant role in our understanding of the psyche. (p.80).

I disagree with Iping Petterson and Roll's objections too. It is not fair to say that science considers anomalous events unworthy of investigation; I would argue that the opposite is true. In fact, broadly speaking in the current climate, scientists might be more willing to investigate and accept investigations of anomalous phenomena than phenomena described as psychic or parapsychological.

I agree with the proposal for using more neutral and more general terminology that does not carry such implicit assumptions and, despite the above objections, I have decided to use the term 'anomalous experiences' during the course of my research. One of the main reasons why I chose to use the term 'anomalous' is that it allows the inclusion of experiences, such as unidentified flying objects (UFOs), which are not strictly considered to be paranormal. Why is the inclusion of such phenomena important in the context of this thesis? One of the aims is to consider links between sleep-related experiences and reports of anomalous phenomena. Interestingly, some alien abduction experiences have been reported around the time of sleep (Gallagher, Kumar, & Pekala, 1994; Spanos, Cross, Dickson, & DuBreuil, 1993), and one possible explanation for such nocturnal experiences is that they are misinterpretations of normal sleep-related experiences (see Chapters 4 and 5).

Experiences

As there are different interpretations of the terms 'paranormal' and 'parapsychological,' it is not surprising that there are different opinions regarding which types of phenomena should be included under such headings. As we have seen earlier, the issue of scope is relatively difficult to resolve given the difference between lay and academic perspectives. Nevertheless, there is a broad consensus that parapsychological research consists of three main domains (Irwin, 1994a, p.6): extrasensory perception (ESP), psychokinesis (PK) and survival research.

ESP

> An *extrasensory experience* is one in which it appears that the experient's mind has acquired information directly, that is, seemingly without either the mediation of the recognized human senses or the processes of logical inference. (Irwin, 1994a, p.6).

ESP can be subdivided into three main categories: (1) telepathy – accessing information directly from another person; (2) clairvoyance – accessing information about objective events or objects; (3) precognition – accessing information about the future. Sometimes 'retrocognition' is used to refer to the process of accessing information about the past via ESP (Irwin, 1994a; Dale & White, 1977).

PK

> A PK experience entails an apparent mind-over-matter effect, that is, a case where an individual's thoughts or preferences appear to have had a direct influence upon the structure of the physical environment. The influence seemingly occurs without the mediation of recognized physical energies or mechanisms, particularly those compromising the human motor system. (Irwin, 1994a, p.8).

PK tends to be divided into two categories according to the magnitude of the effect and its ease of detection. Micro-PK effects are relatively weak, are rarely visible to the naked eye and usually require the use of statistics to detect the effects; macro-PK effects are stronger, visible to the naked eye and do not require the use of statistics to detect the effect (Palmer & Rush, 1986, p. 224).

PK phenomena may include the movement or distortion of objects, physical mediumship, influencing dice or random event generators (REGs), or making impressions on photographic film (see Irwin, 1994a, 1999). Psychic healing or direct mental interaction with living systems (DMILS) (see Irwin, 1994a, 1999; Radin, 1997) are also considered to be micro- or macro-PK effects in some instances.

Poltergeist phenomena are sometimes referred to as 'recurrent spontaneous psychokinesis' in order to reflect one possible explanation for them, which is that they are caused by the PK ability of a human agent (Roll, 1977). One definition of poltergeists compiled by Dale and White (1977, p. 930) is as follows:

> Poltergeist phenomena involve the unexplained movement or breakage of objects, etc., and often seem to center around the presence of an adolescent; they differ from hauntings in that apparitions are rarely seen.

In order to try to circumvent the problem of implicit theoretical connotations, Thouless and Wiesner (1948) proposed the term 'psi phenomena' as a generic term for both extrasensory perception (ESP) and psychokinesis (PK) phenomena, which are the two main areas of experimental parapsychology.

Survival of bodily death

This domain is concerned with whether part of a person is able to survive bodily death. Phenomena included under this category would include communication with the dead, e.g., physical and mental mediumship, apparitions of the deceased, hauntings (e.g., Green & McCreery, 1975; MacKenzie, 1982; Tyrrell, 1943/1973), and reincarnation (e.g., Stevenson, 1977, 1987). Poltergeist phenomena might also be classified under this heading if they were found to be caused by deceased spirits (e.g., Gauld & Cornell, 1979; Roll, 1977). Out-of-body (OBEs) (e.g., Blackmore, 1982a; Green, 1968; Irwin, 1985b) and near-death experiences (NDEs) (e.g., Ring, 1980) may also be associated with this domain because they might constitute evidence for a separate consciousness or a soul.

Other anomalous experiences

Other additional anomalous experiences were included as part of the anomalous experiences and beliefs items used in this thesis because they were reported by Wilson and Barber's (1983) original fantasy-prone participants (e.g., spiritual and religious experiences, seeing auras) or because they have been correlated with fantasy proneness, e.g., feelings of déjà vu (Myers & Austrin, 1985) or seeing with eyes closed (Alvarado & Zingrone, 1994). Unidentified flying objects (UFO) experiences were included because some contact and abduction experiences often occur around the time of sleep (see Spanos et al., 1993) and because some researchers have argued that such abductees sometimes exhibit fantasy-prone characteristics (Bartholomew, Basterfield, & Howard, 1991).

Beliefs

Beliefs form part of a broader concept of attitudes with an attitude being defined as:

> a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor. (Eagly & Chaiken, 1993 p. 1).

As Eagly and Chaiken (1993) pointed out, traditionally attitudes have been conceptualised as being made up of three components: cognitive (e.g., thoughts and beliefs), affective, and behavioural. However, it should be pointed out that, as yet, there is no universally agreed definition of attitudes (Olson & Zanna, 1993) and some researchers have questioned such tripartite definitions (see Tesser & Shaffer, 1990). One question, which we might raise, is whether we should simply focus on what people think about paranormal phenomena without also considering how they feel or how they behave in relation to them? Certainly when paranormal phenomena are mentioned as a topic of conversation one can witness extremes in terms of emotion, and also behaviour, which are closely tied to individuals' beliefs. As part of a recent discussion of measurement issues relating to paranormal beliefs, both Lawrence (1995a, 1995b) and Tobacyk (1995a, 1995b) have called for future measures to take account of additional factors such as the causes (Lawrence, 1995a) or the structural characteristics or personal significance of the beliefs (Tobacyk, 1995a, 1995b). However, although I agree with these suggestions, this thesis will focus only on beliefs in terms of their role as a cognitive component, as this is how they are treated by Irwin (1992, 1993a) and Lawrence (1998) and this thesis will be attempting to test parts of their proposed models.

One important question, which has yet to be fully resolved, is the question of whether paranormal/anomalous belief is a uni- or multi-dimensional concept. If paranormal belief is a uni-dimensional concept then a person who has a high degree of belief in one phenomenon will have a tendency to believe in most phenomena; if it is a multi-dimensional concept then a person with a high degree of belief on one particular dimension may not necessarily have a similar level of belief on another dimension (obviously, this would depend on the orthogonality of the dimensions).

Although some researchers seem to have assumed that the concept of paranormal belief is uni-dimensional, there does seem to be a growing consensus that it is, in fact, multi-dimensional (e.g., Clarke, 1991; Gallagher et al., 1994; Grimmer & White, 1990; Irwin, 1993a; Lawrence, 1995a, 1998; Sparks, Nelson, & Campbell, 1997; Thalbourne & Delin, 1993; Tobacyk, 1995a). There is also evidence to suggest that paranormal experience is a multi-dimensional construct too (Kohr, 1980; Richards, 1990; Ross & Joshi, 1992).

If paranormal belief and experience are multi-dimensional concepts, then it is possible that there might be qualitative as well as quantitative differences between believers/experiencers (Irwin, 1997). The results of a cluster analysis of Tobacyk's (1988) Revised Paranormal Belief Scale (PBS) have suggested four possible types of paranormal believer which were named 'Traditional Religious believers', 'Tentative believers', 'Skeptics', and 'New agers' (Irwin, 1997).

It is unlikely that these questions regarding the dimensionality and typology of paranormal belief can be fully resolved until agreement has been reached regarding the definition of paranormal or anomalous (or whatever) and a measure which adequately covers the domain of relevant phenomena has been developed (Irwin, 1997). For example, the number of possible factors elicited is likely to depend on the range of items included in the scales (Irwin, 1993a). As pointed out earlier, there is a lack of agreement over the definition of paranormal and this is reflected in the variation in the scope of measures designed to assess paranormal belief (Irwin, 1993a; Kennedy, Kanthamani, & Palmer, 1994). Measures range from narrower assessments of belief in ESP (often referred to as 'sheep-goat scales') to broader assessments (Lawrence, 1998, p.40) which include "not only parapsychological claims but all manner of magical, superstitious, religious, supernatural, occult, and other notions…" (Irwin, 1993a, p.2). Although some broad measures, such as the Revised Paranormal Belief Scale (Tobacyk, 1988), do reinforce the multi-dimensional nature of paranormal belief (Lawrence, 1998), there is some disagreement over the actual number of dimensions, even within the same measure (see Lawrence, 1995a, 1995b; Lawrence & De Cicco, 1997; Lawrence, Roe, & Williams, 1997, 1998; Tobacyk, 1995a, 1995b).

If paranormal/anomalous belief is a multi-dimensional concept and/or if there are different types of believers then these must be borne in mind when comparing the results of different studies and when trying to make generalisations (Irwin, 1993a).

Chapter Summary

This chapter has considered how people may categorise 'normal', 'abnormal' and 'paranormal' phenomena and the problems with defining and differentiating between various terms which have become synonymous with the term 'paranormal'. Some of these terms have implicit assumptions regarding explanations for the phenomena and moves have been made towards the use of more neutral and more descriptive terminology.

This thesis will use the terms 'anomalous experiences' and 'anomalous beliefs' rather than 'paranormal experiences' and 'paranormal beliefs' because they are considered to be more neutral, because they will allow the inclusion of experiences not usually considered to be paranormal, such as those involving UFOs, and because they refer more to the features of the experience rather than to whether or not the experience can be explained by current scientific knowledge. It is important to include UFO experiences because they are often reported around the time of sleep and it has been argued that some alleged abduction experiences might be misinterpretations of normal HG/HP experiences.

Regardless of the actual nature of these experiences, surveys have found that a large number of people believe they have experienced genuine anomalous/paranormal experiences of various kinds and these experiences can have significant effects on their lives. Many people also believe in the possibility of these phenomena even if they have not personally encountered them. It is not yet clear whether there are distinct types of believers and, if so, how many distinct types of paranormal belief there are. The difficulties, which arise in trying to answer these questions, reflect the lack of consensus regarding the definition and scope of the concept of 'paranormal belief'.

Chapter 2 will discuss the lines of research into the correlates of anomalous or paranormal beliefs.

Chapter 2

Correlates of anomalous or paranormal beliefs

The aim of this chapter is to describe some of the factors that are reported to have influenced people's belief or disbelief in anomalous/paranormal phenomena and then to review evidence that suggests that specific individual attributes are related to the strength of belief in these phenomena. As part of this review, the possible nature of the relationship between anomalous/paranormal experience and beliefs will be considered. Finally, this chapter will consider some of the problems with research into the correlates of anomalous/paranormal beliefs.

What factors influence people's belief/disbelief in anomalous or paranormal phenomena?

There are a number of factors that are thought to influence a person's belief or disbelief in anomalous or paranormal phenomena. These are similar to the factors associated with the formation of attitudes and opinions in general (e.g., see overview by Oskamp, 1977). It is surprising that, although there have been numerous surveys trying to establish what proportion of people have experienced or believe in such phenomena, very few surveys have directly asked people what factors have actually influenced their beliefs. I have broadly divided these factors into internal and external factors (see Table 1).

Internal factors

The reason for having paranormal beliefs that appears most frequently in the literature is personal experience (e.g., Blackmore, 1984; Clarke, 1995; Milton, 1992; Roe, 1998; Schmeidler, 1985; Zusne & Jones, 1989), i.e., you have an experience that you consider to be paranormal and this leads you to develop and/or strengthen your belief in the existence of such phenomena. However, one should note that such experiences may not necessarily be genuine; the important thing is that they are perceived as such by the individuals concerned.

Although personal experience does not appear to be a frequently cited reason for disbelief in these kinds of phenomena (Roe, 1998), a lack of personal experience has been cited as a reason for disbelief (Clarke, 1995). It also appears that certain individual characteristics, such as demographic, attitudinal, cognitive, and personality factors, are thought to influence belief in paranormal phenomena (see review by Irwin, 1993a). These will be discussed later in this chapter.

Table 1 Factors that are thought to influence belief or disbelief in anomalous or paranormal phenomena.

Internal factors	**External factors**
Personal experience	Experiences of other people
	Views of family, peers, groups to which one is a member
Individual characteristics	Media and formal persuasion
Demographic	Culture
Attitudinal	Religion
Cognitive	Empirical evidence
Personality	

External factors

The experiences and views of people that we know personally (Blackmore, 1984; Clarke, 1995), such as our family and our peers (Irwin, 1999; Oskamp, 1977; Zusne & Jones, 1989), are likely to be quite persuasive in encouraging or confirming our own beliefs in anomalous phenomena. Our beliefs can also be influenced by information portrayed in the media (Blackmore, 1984; Clarke, 1995; Irwin, 1999; Oskamp, 1977; Sparks, 1998) or via other forms of formal persuasion (Zusne & Jones, 1989). We may also be swayed by our own investigation and evaluation of the amount and quality of available evidence and/or our knowledge of fraud (Clarke, 1995; Schmeidler, 1985). The interpretation of this kind of information is likely to be affected by our individual characteristics, particularly our cognitive abilities. It is possible that our beliefs in paranormal phenomena might be influenced by other pre-existing beliefs/worldviews too (Clarke, 1995; Schmeidler, 1985; Zusne & Jones, 1989). Schmeidler (1985) has argued that one of the reasons why some people may be somewhat indecisive, with regard to their paranormal beliefs, is that they have received conflicting messages from the media, different people, and/or different doctrines.

While I do recognise the relevance of these external factors, I wish to focus on the internal factors because I feel that they play a greater role in the development of anomalous/paranormal beliefs than the external factors and because personal experience seems to have one of the strongest influences, in my opinion. I am in agreement with Irwin (1993a) and Schumaker (1990) who argue that culture may shape one's paranormal beliefs but ultimately the likelihood that one will hold such beliefs is dependent upon one's individual make-up.

The relationship between personal experience and anomalous/paranormal beliefs

Although personal experience is the most common reason cited for holding paranormal beliefs, is there any evidence to suggest that the amount of personal experience is related to the strength of belief in anomalous/paranormal phenomena?

A number of studies, using a variety of measures, have found small to medium correlations between global measures of experience and belief (i.e., those based upon a range of different types of phenomena) ranging from $r = .32$ to $r = .69$ (Atkinson, 1994; Gallagher et al., 1994; Glicksohn, 1990; Irwin, 1985a; Lawrence, 1998; Lawrence et al., 1995; Pekala, Kumar, & Marcano, 1995) with the mean correlation across these studies being $r = .52$.

Studies have also found relationships between global experience measures and specific beliefs (ranging from $r = .12$ to $.34$), such as ESP (McClenon, 1994a; Murphy

& Lester, 1976) or belief in life after death (Willging & Lester, 1997). Relationships have also been found between specific experiences, such as déjà vu ($r = .18$), having detected being stared at ($r = .32$), having seen auras ($r = .38$), OBEs ($r = .38$), experience of psychic healing ($r = .41$), memories of a past life ($r = .39$), possession of mediumistic abilities ($r = .51$) and a global measure of paranormal belief (ranging from $r = .18$ to .51) (Thalbourne, 1994b). On average then, there is only about 20-25% (at best 48%) common variance between experience and belief measures. Even if personal experience is one of the major reasons for the development of paranormal or anomalous beliefs, it is clearly not the only possible reason and may not apply to everyone. The fact that more people seem to believe in these phenomena than have experienced them also supports this conclusion (e.g., Haraldsson, 1985; Schouten, 1983).

Many of the measures used in the aforementioned studies have used measures with different items and differ in the types of phenomena included. This makes it difficult to make direct comparisons of their findings but clearly there is a fairly well-established small to medium relationship between measures of anomalous/paranormal experiences and related beliefs. The question is what are the causes of such a relationship? There are three main theories/explanations for this relationship: (1) the experiential source explanation which proposes that personal experience of purported anomalous phenomena (either genuine or misinterpreted) causes a person to develop or strengthen their belief in that specific phenomenon (and/or possibly anomalous phenomena in general); (2) the cognitive source explanation which proposes that our beliefs in such phenomena cause us to report more experiences and/or to perform better in experimental psi tasks. It is also possible that our beliefs might moderate or shape our experience rather than causing it; (3) the reciprocal causality explanation which proposes that the effects of these two variables are reciprocal. We will see in Chapter 3 that the authors of two recent models of the childhood antecedents of paranormal belief disagree as to which of these explanations they favour; Lawrence (1998; Lawrence et al., 1995) favours the experiential source explanation whereas Irwin (1992, 1993a) favours the reciprocal causality explanation.

1. The experiential source explanation

This seems to be one of the most popular explanations, which is perhaps not surprisingly given its popularity as a reason for belief, as we have seen already. However, it has been argued that personal experience (or lack of it) might be an attribution for one's paranormal belief (disbelief) rather than an actual cause (Alcock, 1981; Roe, 1998; Schouten, 1983), i.e., we might not be certain why we hold such beliefs but we might rationalise that it is likely to be due to personal experience (or the lack of it).

The experiential source hypothesis (Hufford, 1982) predicts that certain phenomena have universal elements and will therefore occur in different cultures. If these experiences have universal characteristics, which might be deemed anomalous or supernatural, then similar experiences in different cultures should be associated with similar beliefs. The main idea is that "[s]uch experiences are instrumental in causing changes in belief, rather than merely being caused by belief." (McClenon, 1994b, p. 8).

Much evidence in support of the ES hypothesis has been obtained from cross-cultural surveys of anomalous experiences and there does indeed seem to be a great deal of uniformity in the features of anomalous experience and beliefs (McClenon, 1991, 1994a, 1994b; Sheils, 1978). My view is that some of the best evidence for the ES hypothesis comes from hypnagogic/hypnopompic experiences that have been associated with paranormal/supernatural interpretations and beliefs. Surveys have shown that such experiences often have very similar features and interpretations and have been reported in various countries, regions and cultures (Blackmore & Rose, 1996; Dahlitz & Parkes, 1993; Firestone, 1985; Hopkins, Jacobs, & Westrum, 1992; Hufford, 1982; Liddon, 1967; Ness, 1978; Ohaeri, Adelekan, Odejide & Ikuesan, 1992; Roper Starch Worldwide, 1998; Spanos, McNulty, DuBreuil, Pires, & Burgess, 1995). The features of the hypnagogic/hypnopompic and sleep states and these cross-cultural experiences with anomalous interpretations will be discussed in Chapter 4.

2. The cognitive source explanation

Alternative explanations for the correlation between experience and beliefs are that beliefs cause a person to experience and/or report anomalous phenomena, or at least misinterpret normal phenomena. The main basis for this argument seems to be the assumption that beliefs are associated with, or caused by, what Irwin (1993a) has termed "cognitive deficits'. The basic idea is that believers are more likely to misinterpret normal experience or information and that these errors lead them to report more anomalous experiences.

Another reason why believers might report more paranormal experiences is that they might actively seek out situations in which they could experience or witness such experiences, such as visiting a psychic or an alleged haunted house, whereas disbelievers might actively avoid such situations.

Perhaps some of the best evidence for the cognitive source explanation comes from experimental studies of the sheep-goat effect. Gertrude Schmeidler (Schmeidler & McConnell, 1958) investigated whether believers and sceptics would show differential performance in forced-choice ESP card-guessing tests. The results showed that overall believers in ESP (who were termed 'sheep') and sceptics (who were termed 'goats') did differ; sheep tended to perform better than chance whereas goats tended to perform worse than chance. Although the sheep-goat effect has been confirmed by numerous researchers (see review by Palmer, 1971; Lawrence, 1998), Palmer's (1971) review of the research concluded that the effect size seemed quite small, and therefore difficult to detect with small samples, and that it might be influenced by the experimental context.

In order to obtain an overall estimate of the effect size for the sheep-goat effect, and to see if this was also dependent on methodological factors, Lawrence (1993, 1998) conducted a meta-analysis of 73 sheep-goat studies that were published between 1947 and 1993. The results confirmed that the overall effect size was small ($r = 0.029$) but highly significant (combined $z = 8.17$, $p = 1.33 \times 10^{-16}$) and would require an additional 1726 null studies to cancel out this effect. There was no significant relationship between study quality and effect size nor between the type of belief measure and the effect size. This latter finding is reassuring given the problems with the measures of paranormal belief that have already been described. Thus, Lawrence (1998) concluded, quite rightly, that the sheep-goat effect is consistent and robust (at least for forced-choice ESP tests), though the effect size is small.

Nevertheless, Lawrence (1998) questioned whether one should interpret the sheep-goat effect as an indication that belief in ESP directly affects ESP performance. Lawrence argued that sheep-goat studies are really only quasi-experimental because the experimenter does not actually manipulate belief in ESP nor randomly allocate participants to the belief conditions; participants are simply grouped together according to their existing beliefs. Thus, the two groups may differ on some other important variables that affect ESP performance. This makes it more difficult to establish whether any sheep-goat effects are entirely due to the differences in beliefs and not due to other variables. This is a valid design point but in practice it might be difficult for the experimenter to induce a sufficiently large change in beliefs in the experimental context and to be certain that the manipulation itself has been successful.

This problem of potential confounding variables also extends to the cognitive source explanation in general, i.e. it is difficult to establish whether it is beliefs per se, or cognitive deficits that are associated with them, that are responsible for the misinterpretation of normal experiences.

Even if paranormal beliefs do not actually cause anomalous/paranormal experiences directly, there is evidence to suggest that one's beliefs (or knowledge) may shape one's experience. There is evidence from spontaneous case reports to suggest that knowledge, beliefs and expectations may influence the content of hypnagogic/hypnopompic experiences. For example, in one case that I have collected, an individual, who experiences hypnagogic/hypnopompic imagery and sleep paralysis quite regularly, reported that:

> After seeing Whitley Streiber's film 'Communion' I did have an hallucination of one of the little blue aliens inserting [a] metal probe into my forehead.

To someone with beliefs in alien abductions, and/or a lack of knowledge about hypnagogic/hypnopompic experiences, this could have been interpreted as a real abduction attempt. I would also argue that some psychomanteum experiences, in which people report reunions with deceased relatives, involve hypnagogic/hypnopompic-like imagery and that the content of such imagery could be influenced by the beliefs and expectations of those participants too (Sherwood, 2000; see Chapter 5). Comparisons of accounts of NDEs have also found evidence of different features appearing in reports from different groups that seemed to be linked to their religious beliefs (see Greyson, 2000, p. 321).

3. *The reciprocal causality explanation*

This final explanation is a simply a combination of the two previous explanations and is based on the premise that experience causing belief and belief causing experience are not necessarily mutually exclusive hypotheses. Irwin (1985a) concluded that both possibilities are likely to occur and later proposed this in his model of the childhood antecedents of paranormal belief (Irwin, 1992, 1993a).

So, based upon the relatively small correlations obtained between measures of anomalous/paranormal experiences and associated beliefs, it seems that personal experience is not the only factor that might influence a person's paranormal beliefs. Clearly, one should consider the circumstances in which these anomalous/paranormal experiences seem to occur and the characteristics of those who report them in order to see if there are moderating factors. Any given experience, and the interpretation of it, will depend upon the circumstances and a person's individual characteristics, i.e., there is likely to be a state x trait interaction. It is also possible that people with certain characteristics might be more likely to hold anomalous/paranormal beliefs, regardless of any personal experience. With the ES hypothesis, the key factor is that a particular event (or events) that is experienced by a particular individual at a particular time(s) causes their beliefs to change in some way. With the cognitive source explanation, the extent to which our beliefs can influence our experiences, or our interpretation of them, may also depend upon the circumstances.

In what circumstances are anomalous/paranormal experiences reported?

Although anomalous/paranormal experiences have been reported in a variety of different circumstances, there do seem to be some common trends across different experiences which suggest that some circumstances may be particularly conducive to reports of these kinds of experiences.

Many experiences, such as ESP, some auditory PK, healing, apparitions, psychomanteum experiences, mediumship, OBEs, autoscopic experiences and alien abduction experiences, have been reported when the individual concerned was physically relaxed, in a calm mental state and/or involved in minimal physical activity or engaged in some repetitive highly-practised activities that might be almost automatic (Alvarado, 2000; Dening & Berrios, 1994; Glicksohn, 1986; Green, 1968, p. 50; Green & McCreery, 1989; see Irwin, 1994c; Mack, 1994; Moody with Perry, 1993; Rhine, 1962, 1963; Sannwald, 1963; Spanos et al., 1993). Nevertheless, this is not always the case as, with NDEs (and some OBEs) and some healing rituals, the individual concerned may be under some kind of threat or stress, or may be highly aroused at the time of the experience (e.g., Irwin, 1985b, 1994c; Krippner & Achterberg, 2000, p. 358).

Some experiences, such as ESP, OBEs, apparitions and psychomanteum experiences and healing experiences, may occur in circumstances in which there is minimal sensory input and possible sensory deprivation and/or the person's attention is internally-focused or the circumstances allow one to become easily absorbed in one's own mentation (e.g., Gurney et al., 1886; see Irwin, 1994c, 1999, p. 229; Moody with Perry, 1993).

Many of these circumstantial features occur during altered states of consciousness (ASCs), such as meditation, hypnosis, sleep and the hypnagogic/hypnopompic states (e.g., Honorton, 1977). It is not surprising then to find that a variety of anomalous experiences, such as ESP, healing, apparitions and psychomanteum experiences, mediumship, memories of previous lives, OBEs and autoscopic experiences and alien abduction experiences, have been reported during such ASCs (e.g., Dening & Berrios, 1994; Green, 1968; Green & McCreery, 1989;

Gurney et al., 1886; Irwin, 1994c; Krippner & Achterberg, 2000; Leaning, 1925; Mack, 1994; Moody with Perry, 1993; Palmer, 1978b; Rhine, 1981; Sheils, 1978; Spanos et al., 1993).

Experimental studies have also found that ASCs are conducive to anomalous experiences or performance. In a review of experimental studies of psi performance during meditation, hypnosis, induced relaxation, and ganzfeld stimulation, Honorton (1977) concluded that:

> These findings provide strong support for the following empirical generalization: *Psi functioning is enhanced (i.e., is more easily detected and recognized) when the receiver is in a state of sensory relaxation and is minimally influenced by ordinary perception and proprioception.* (p. 466).

Honorton (1977) further concluded that there are four major features of psi-enhancing internal states: "(a) a sufficient level of cortical arousal to maintain conscious awareness; (b) muscular relaxation; (c) reduction of exteroceptive input from peripheral receptors; and (d) deployment of attention toward internal mentation processes." (p. 466). Features (b) to (d) would be true of the hypnagogic/hypnopompic and sleep states, though (a) might only be true of the hypnagogic/hypnopompic states and some sleep states, such as lucid dreaming. Braud and Braud's (1975) proposed psi-conducive syndrome also included the aforementioned features plus a reduction in left-hemisphere functioning and a concomitant increase in right-hemisphere functioning, an altered worldview and a temporary importance of psi. However, although these studies have suggested that the presence of these features is associated with successful psi performance, it is not clear whether they are all necessary or which are the most important.

In summary, people who find themselves in these circumstances, and who may find it easier to enter and become absorbed in these purportedly psi-conducive circumstances, particularly ASCs, may be more likely to report anomalous/paranormal experiences and beliefs.

What kinds of people report anomalous/paranormal beliefs?

In his review of the empirical literature on paranormal beliefs, Irwin (1993a, 1999) has summarised four basic approaches to the study of individual differences in why people hold paranormal beliefs:

1) Demographic correlates and the social marginality hypothesis
2) Attitudinal correlates and the worldview hypothesis
3) Cognitive correlates and the cognitive deficits hypothesis
4) Personality correlates and the psychodynamic functions hypothesis

1) Demographic correlates and the social marginality hypothesis

This hypothesis is based on the idea that people who hold paranormal beliefs will be those who are members of socially-marginal groups within society. Thus it is predicted that members of society who are old, female, of low socio-economic status, members of ethnic groups and/or divorced or separated should be more likely to hold paranormal beliefs (see Irwin, 1999, pp. 282-283). Holding paranormal beliefs is thought to offer some form of compensation for one's marginal status. However, this hypothesis is fairly weak in that it fails to explain exactly what compensations are gained from holding specific beliefs. I suspect that there is also an implicit assumption that paranormal belief is unidimensional. However, there is a growing consensus, based upon factor analyses, that paranormal belief is multi-dimensional (e.g., Clarke, 1991; Gallagher et al., 1994; Grimmer & White, 1990; Irwin, 1993a; Lawrence, 1995a, 1998; Lawrence et al., 1997, 1998; Sparks, 1998; Sparks et al., 1997; Thalbourne & Delin, 1993; Tobacyk, 1995a).

Having reviewed the empirical literature, Irwin (1993a, 1999) concluded that, contrary to the social marginality hypothesis, most paranormal beliefs (with the exception of traditional religious beliefs) seem to be stronger among young people. However, as noted by Irwin (1993a) and Lawrence (1998), one of the problems with these studies is that they are cross-sectional and there may be cohort or maturational effects. Longitudinal studies, or at least qualitative investigations of how people's beliefs have developed and changed over their lifetime, are needed to satisfactorily address this question; cross-sectional studies are too blunt a tool in this instance.

In terms of gender, there is evidence that certain paranormal beliefs are more frequent and stronger among women than men (see review by Irwin, 1993a), although some studies have found no differences (see Zusne & Jones, 1989). There is also evidence that women are more likely to believe in phenomena associated with human capabilities, such as psi, whereas men seem to have stronger beliefs in extraordinary life-forms, such as UFOs or the Loch Ness monster (Lawrence, 1998). As Lawrence (1998) correctly noted, it is difficult to see how the social marginality hypothesis could account for this gender x type of belief interaction. Even if gender differences do exist, there is a lack of explanation as to why men and women differ.

There has been relatively little research into the relationship between socio-economic status and paranormal belief. One of the difficulties with such research is that, although many people may agree on some of the indicators of socio-economic status, the construct is difficult to define and measure directly and participants may not take too kindly to being asked about their employment status, occupation and income etc. (Irwin, 1999). The social marginality hypothesis would predict a negative correlation between socio-economic status and strength of paranormal belief, i.e., the worse off you are, the stronger your paranormal beliefs. One study, by Emmons and Sobal (1981), found that those who were unemployed tended to have lower levels of paranormal belief, which is contrary to the social marginality hypothesis.

Another social marginality variable that has been investigated is marital status. Although there has not been very much research into this area (Irwin, 1993a, 1999), there is some evidence that married people have lower beliefs in certain phenomena, such as ESP, astrology, witchcraft and extraordinary life forms (Emmons & Sobal, 1981) and those who are divorced or separated have a greater belief in astrology (Wuthnow, 1976). However, many of these phenomena would not be considered to be paranormal by many researchers because they do not involve human capabilities. One explanation for these findings might be that having a partner provides a sense of support and control over one's life but losing a partner, particularly if apparently through no fault of your own, may lead to the development of a need for control, which might be provided by the endorsement of certain paranormal beliefs. A better test of this particular hypothesis would be to measure paranormal beliefs before and after a separation and see if there's a change in the predicted direction; however, such research is likely to be difficult in practice.

In summary, although there is some support for a relationship between some social marginality indicators and certain paranormal beliefs, there does not appear to be any consistent relationship with the same dimensions of belief (Irwin, 1993a, 1999). If the true picture is more complex then the social marginality hypothesis has difficulty in accommodating this complexity. In my opinion, the social marginality hypothesis is too broad and too general and fails to specify exactly how the paranormal beliefs develop as a result of the particular marginalities or what benefits are gained from them.

2) Attitudinal correlates and the worldview hypothesis

The attitudinal correlates hypothesis seems to be reasonable given the predictions of the Cognitive Dissonance theory (see Oskamp, 1977). This theory argues that people attempt to maintain consistency between the components of attitudes and also between related attitudes. Inconsistencies cause psychological discomfort that motivates the person to make appropriate adjustments to their attitudes in order to achieve consistency again. Thus, we might expect emotions, beliefs and behaviours towards the paranormal and related issues to be fairly consistent. However, with attitudes in general, researchers have begun to question whether all three components are required to form an attitude. This is partly due to the finding that there are varying degrees of consistency between components of various attitudes (see Eagly & Chaiken, 1993, pp. 16-17).

Zusne and Jones (1989) proposed that those most likely to develop paranormal beliefs are those who already hold particular attitudes and views that could easily accommodate, or at least would not seriously contradict, such beliefs. More specifically, Zusne and Jones (1989) predicted that people who believe in and/or engage in activities associated with a subjective and esoteric orientation should also tend to belief in the paranormal. There is some evidence to support this hypothesis; for example, global paranormal belief has been positively correlated with subjective views of the universe and human behaviour (Zusne & Jones, 1982) and dualist philosophies (Stanovich, 1989; Svenson, White, & Caird, 1992). Those who devote more attention to subjective experience, or who engage in interpretation of their dreams, are also more likely to hold paranormal beliefs (e.g., Davies, 1985; Glicksohn, 1990; Haraldsson, 1981; Irwin, 1985a; Thalbourne, 1984, 1994b). There is also evidence that paranormal believers are more likely to think that events are beyond their control, i.e., they are more likely to have an external locus of control (e.g., Irwin, 1986b; Thalbourne, Dunbar, & Delin, 1995).

The worldview hypothesis would also predict that people who hold traditional religious beliefs are likely to hold paranormal beliefs. However, research has found that some dimensions of paranormal belief correlate in the predicted direction, some in the opposite direction and some do not correlate at all (Clarke, 1991; Tobacyk & Milford, 1983). The worldview hypothesis is unable to account for these findings.

There is also evidence that believers, not surprisingly, are more likely engage in related activities, such as reading about (Irwin, 1985a) or taking courses about the paranormal (e.g., McGarry & Newberry, 1981).

In conclusion, with regard to the worldview hypothesis there has been little research looking at correlations with specific dimensions of paranormal belief. Another problem with these findings is that, again, they do not indicate causality. It may be that strong pre-existing attitudes towards the world may shape our attitudes towards the paranormal, the latter may shape the former, or both sets of attitudes may be influenced by some other variable(s). If pre-existing attitudes do influence our paranormal beliefs, one naturally wants to ask the question of what causes people to develop a subjective worldview (Lawrence, 1998).

3) Cognitive correlates and the cognitive deficits hypothesis

The 'cognitive deficits hypothesis' was coined by Irwin (1993a, 1999) who pointed out that, "Under this collective view the believer in the paranormal variously is held to be illogical, irrational, credulous, uncritical, and foolish." (1999, p. 287). The general idea, then, is that a person becomes a believer because their cognitive abilities are not up to scratch; for example, they may have poor reasoning or critical thinking skills that lead them to draw inappropriate conclusions from information presented to them or they may misperceive or misinterpret particular events as being paranormal. There is often an implicit assumption that no genuine anomalous processes or agencies are involved. Under this hypothesis, cognitive deficits could lead directly to the formation of paranormal beliefs and/or indirectly via the misinterpretation of normal experiences. Irwin (1993a) noted that there are four main correlates that have been investigated: educational attainment, scientific education, intelligence and reasoning skills, and creativity and imagination.

The findings with regard to educational attainment have been somewhat mixed. Some research has found that stronger paranormal belief is associated with a lower grade point average (Messer & Griggs, 1989; Tobacyk, 1984) for some aspects of paranormal belief whereas other research has found that stronger beliefs in psi or traditional religious beliefs are associated with higher grade point averages (Tobacyk, Miller, & Jones, 1984). It may be that the relationship is dependent upon the educational level of the students (Irwin, 1993a) and/or the particular dimension of paranormal belief under investigation (Lawrence, 1998). Apart from looking for relationships with performance at a given level of education, research has also investigated the relationship between paranormal belief and the level of educational attainment ultimately reached. Again there have been mixed findings. Some research has found a positive relationship between belief in psi and the level of education reached (Emmons & Sobal, 1981; Haraldsson, 1985; Tobayck et al., 1984); other research has found a negative relationship (Haraldsson, 1985; Otis & Alcock, 1982). Lawrence (1998) noted that the only dimension of paranormal belief that seems to have a consistent negative relationship with the level of educational attainment is that concerning spiritualist beliefs.

One of the reasons for the mixed findings may be that educational attainment is a very broad construct (Lawrence, 1998) and there are numerous possible confounding variables that might affect its relationship with paranormal belief (Irwin, 1993a). There are bound to be a myriad of reasons that influence one's level of attainment and these will not necessarily relate to one's abilities or beliefs. Even if this relationship is causal, there do not appear to be any specific suggestions as to how paranormal belief actually affects level of attainment. Again this is likely to be difficult given the general nature of the indices used to assess performance/attainment.

In terms of specific educational experience, there is some evidence to suggest that those who have had a scientific background tend to report lower paranormal beliefs (Otis & Alcock, 1982). But, if this relationship is causal, it is not clear whether this is due to changes in reasoning or a culture that generally discourages acceptance of such beliefs.

There has also been research that has looked at more specific measures of cognitive capacity/abilities, such as intelligence and reasoning skills. Although it would seem to be a fairly obvious variable to investigate from a cognitive deficits perspective, reviews of the literature on paranormal belief have noted the lack of research into the relationship between intelligence and paranormal belief (Irwin, 1993a; Lawrence, 1998). However, a number of studies have found a negative relationship between IQ and measures of superstitious beliefs (see Zusne & Jones, 1989, p. 238). In terms of paranormal beliefs, Smith, Foster & Stovin (1998) found a negative relationship in two out of three context conditions.

Some studies have found that paranormal believers have poorer critical thinking or reasoning abilities (e.g., Alcock & Otis, 1980; Tobacyk & Milford, 1983; Wierzbicki, 1985) though other studies have not confirmed such a negative relationship between paranormal belief and reasoning skills (Irwin, 1991b; Roe, 1999). Irwin (1993a) and Roe (1999) have noted that much of this research has been carried out by researchers who are sceptical about the paranormal and this may have influenced the participants' responses. In addition, Tobacyk and Milford (1983) pointed out that poor critical thinking might not be associated with all dimensions of paranormal belief; for example, they found that traditional religious believers tended to be relatively critical whereas those who believed in spiritualism were not. There is also evidence that believers tend to underestimate the probability of chance occurrences and perform worse than disbelievers at probability tasks (Blackmore &

Troscianko, 1985).

In summary, although the findings with regard to educational attainment are equivocal, there is some indication that believers might be deficient in some cognitive abilities, such as assessing the probabilities of events. However, a clear picture of exactly which dimensions of belief are associated with such deficits is yet to emerge.

Much of the research into the cognitive correlates of paranormal belief has tended to associate believers with negative characteristics or deficits (Lawrence, 1998). However, research has also investigated relationships with more positive variables.

For example, paranormal belief has been positively correlated with measures of creativity (Davis, Peterson, & Farley, 1974; Thalbourne & Delin, 1994). Some research has also found a positive correlation between hypnotic susceptibility and paranormal belief (Atkinson, 1994; Nadon, Laurence, & Perry, 1987; Pekala, Kumar, & Cummings, 1992) or attitude towards parapsychology and the supernatural (Wagner & Ratzeburg, 1987); others have failed to confirm such a relationship (Saucer, Cahoon, & Edmonds, 1992). Linked to hypnotic susceptibility, is the construct of fantasy proneness which, although it is deemed to be a personality variable (Wilson & Barber, 1983), also has links with cognitive variables.

Fantasy prone personalities, as characterised by Wilson & Barber (1983), are fairly rare (estimated 4% of population) but many people may share some fantasy prone characteristics. Fantasy prone individuals typically demonstrate high imaginative ability, frequent episodes of hypnagogic/hypnopompic (HG/HP) imagery, a tendency to become absorbed in real and imagined events (which can occasionally lead to difficulties with reality distinction), a vivid recall of personal experiences, physical concomitants associated with memories and fantasies, and often report a number of psychic experiences (e.g., Lynn & Rhue, 1988; Rhue & Lynn, 1991; Wilson & Barber, 1983). As children, fantasy-prone individuals often lived in a make-believe world for much of the time, played with imaginary companions and felt that their dolls and toys were alive (Lynn & Rhue, 1987,1988; Rauschenberger & Lynn, 1995; Wilson & Barber, 1982, 1983).

Fantasy proneness has also been correlated with paranormal beliefs (Allison, 1996; Council & Huff, 1990; Irwin, 1990, 1991a; Lawrence et al, 1995; Lawrence, 1998); the average correlation is approximately r = 0.35 (range .10-.58). Fantasy proneness is considered to be a key variable in the development of paranormal beliefs, not least because it is one of the few variables that seems to correlate with the majority of the dimensions of belief (see Irwin, 1993a). Fantasy proneness will be considered in more detail in Chapter 3 where a number of proposed models for the development of paranormal beliefs will be introduced. Fantasy proneness, creativity and hypnotizability are also associated with, or are components of, two fairly new psychological constructs: boundary structure (Hartmann, 1991) and transliminality (Thalbourne & Delin, 1994). These will also be considered in Chapter 3.

Lawrence (1998) has suggested that paranormal experiences and beliefs are related to individual characteristics such as the tendency to introspect and the ability to enter into and become absorbed in internal imagery-based experiences. I agree that this is a key point; we have already noted that many anomalous experiences seem to occur when the experient is relaxed, or when cognitive and motor functioning are somewhat dissociated (such as when performing fairly automatic actions), and when attention is focused inwardly. Such experiences are often reported during the hypnagogic/hypnopompic and sleep states, which share some of these features. The relationship between anomalous experiences/beliefs, ASCs and variables associated with the capacity to enter them will be considered in more depth in Chapter 3.

4) Personality correlates and the psychodynamic functions hypothesis

The idea behind this hypothesis is that people hold paranormal beliefs because they meet certain psychodynamic needs (Irwin, 1999, p. 290). For example, Irwin's (1993a) theory suggests that paranormal beliefs provide an illusion of control and a belief that we can cope with, or at least understand, uncontrollable life events.

Although paranormal believers do not seem to be socially withdrawn individuals (Windholz & Diamant, 1974), there is evidence to suggest that they are not particularly interested in other people (Irwin, 1993a). This may support the notion that paranormal believers are people whose attention tends to be more oriented towards their own subjective experience (Irwin, 1993a). This self-concern is also supported by the finding that some dimensions of paranormal belief have been found to be positively correlated with narcissism (Tobacyk & Milford, 1983).

There has not been much research to date on personality dimensions such as extraversion, neuroticism and psychoticism (Lawrence, 1998) but there is some evidence of a small positive relationship between extraversion and global measures of paranormal belief (see unpublished study cited by Lawrence, 1998) and, more specifically, belief in ESP (Thalbourne, 1981; Thalbourne & Haraldsson, 1980). High sensation seekers have also been found to report stronger paranormal beliefs (Kumar, Pekala, & Cummings, 1993). The relationship between neuroticism and paranormal belief is unclear; Windholz and Diamant (1974) found a positive relationship with global paranormal belief but Polzella et al. (1975), cited by Lawrence (1998), did not find a similar relationship. One study by Lester (1993) found that psychoticism was negatively related to some beliefs, such as beliefs in god, life-after-death and the existence of other beings in the universe. Again, with these studies there appears to be little theoretical justification for these predicted differences in personality.

One prediction made by the psychodynamic hypothesis is that those who believe in the paranormal are psychologically maladjusted. As noted by Lawrence (1998), although studies in the 1930s and 1940s found negative relationships between psychological adjustment and superstitiousness, more recent studies have failed to confirm such a relationship. In fact, Schumaker (1987) claimed to have found a positive relationship between psychological adjustment and paranormal belief but it turned out that he had scored the adjustment measure incorrectly and the relationship was in fact negative (Irwin, 1991a).

Studies have also found that paranormal belief is associated with higher magical ideation (e.g., Thalbourne, 1985, 1994a), which is a measure of magical thinking (Eckblad & Chapman, 1983). However, although magical ideation is an indicator of schizotypy or proneness to psychosis one should not automatically assume that paranormal believers are suffering from some form of mental illness. The relationship may not actually be causal and, even if it is, it may only be certain types of believer who show such strong magical thinking (Irwin, 1993a). In my opinion, this relationship between paranormal beliefs and magical ideation and other measures of psychological adjustment may be caused by a more general factor, such as transliminality. The concept of transliminality was introduced by Thalbourne and Delin (1994) and was initially empirically defined as being made up of a number of core components including measures of psychopathology proneness, such as magical ideation, creativity, measures of mystical experience, and paranormal experience/belief. The theory is that highly transliminal people have brains that allow them access, or easier access, to unconscious or subliminal information that may appear in the form of imagery, ideas or emotion. Thus, the relationship between psychological adjustment variables and paranormal beliefs may not be causal but may be a reflection of transliminality.

Drawbacks of research into the correlates of paranormal beliefs

One of the main problems with research into the correlates of paranormal beliefs is that it is difficult to establish causality; correlation alone does not allow us to do so. In order to demonstrate a causal relation between two variables, the following conditions need to be met: association, isolation and directionality (Bullock et al., 1994; Hoyle, 1995). This means that the variables must be correlated, extraneous variables must be ruled out, and the cause must be shown to precede an effect. It is difficult to meet these conditions with correlational data, especially with cross-sectional designs (Bullock et al., 1994). Ideally, longitudinal studies are required, or at least some form of qualitative analysis, such as narrative analysis, that can gain more depth and can take into account the context of events, perhaps in relation to a person's life history.

Apart from causality, it is also difficult to establish whether the correlates are consequent or antecedent of paranormal belief. Another problem is that much of the research for correlates has only looked for bivariate relationships. There are clearly several correlates of paranormal beliefs, some of which might be related to each other. Bivariate analysis cannot take this complexity into account and cannot control for the influence of other variables.

In addition, the proposed explanations behind some of the hypothesised relationships with paranormal belief tend to be rather vague and superficial and do not explain what the specific causal processes are or how they work. Prediction is of only limited value without an underlying explanation. One of the reasons for this lack of explanation is that there has tended to be very little theory guiding research into correlates of paranormal belief. However, the situation is changing and researchers have begun to build and test out specific models of the development of paranormal beliefs using multivariate analysis techniques that can assess the extent to which the proposed models provide an acceptable description of the relationships among the variables (Irwin, 1992, 1993a; Lawrence, 1998; Lawrence et al., 1995). This model-building and testing approach will be discussed in Chapter 3.

Another problem is that researchers have used a variety of different measures; some have looked for correlates of global measures of belief, some have looked for correlates of specific beliefs and some have looked for both. On the one hand, researchers should be looking at relationships with specific dimensions of belief as the construct is clearly multidimensional. On the other hand, attempting to do so with the current lack of agreement over the scope and dimensionality of measures can potentially complicate matters even further. In my opinion, there is sufficient overlap across many of these measures to allow relationships to be detected for the time being but the differences between the measures will cloud the issue and the full true picture is unlikely to emerge until a more ecologically valid measure of anomalous beliefs that fully samples the domain, according to the general public's view, has been developed and accepted and utilised by researchers interested in this area.

Chapter Summary

This chapter has outlined some of the internal and external factors that are reported to have influenced people's belief or disbelief in the paranormal. The most frequently cited factor is personal experience and a number of studies have found significant small to medium positive correlations between global and/or specific measures of anomalous experiences and beliefs that suggest that the more personal experience one has of anomalous phenomena, the stronger one's beliefs in such phenomena.

Assuming that these correlations might reflect a causal relationship, a number of explanations have been proposed for them: (1) the experiential source explanation proposes that personal experience of purported anomalous phenomena causes a person to develop or strengthen their belief in anomalous phenomena; (2) the cognitive source explanation proposes that our beliefs in such phenomena cause us to report more experiences and/or to perform better in experimental psi tasks; (3) the reciprocal causality explanation proposes that the effects of these two variables are reciprocal.

Even if personal experience can alter a person's beliefs, the magnitude of the correlations between measures of these variables indicate that experience is not the only factor involved. The interpretation of personal experience may depend upon other factors, such as the circumstances in which particular events occur and the characteristics of the individual concerned. Many spontaneous anomalous experiences seem to occur when the person concerned is physically relaxed, calm and involved in minimal physical activity or a highly-practised activity. Anomalous experiences also occur in circumstances in which there is minimal sensory input, possible sensory deprivation, and/or the person's attention is focused inward or the circumstances allow one to become absorbed in one's own mentation. Many of these circumstantial features occur during ASCs, such as meditation, hypnosis, the HG/HP state and sleep. Thus, people who find themselves in these circumstances and who may find it easier to enter and become absorbed in ASCs may be more likely to report anomalous experiences and beliefs.

Research has attempted to identify a range of individual characteristics that are associated with paranormal beliefs, such as demographic, attitudinal, cognitive, and personality correlates. Linked to each of these sets of correlates is a hypothesis for why people with these characteristics hold such beliefs: the social marginality hypothesis, the worldview hypothesis, the cognitive deficits hypothesis and the psychodynamic functions hypothesis.

Of all these correlates, fantasy proneness is considered to be a key variable associated with the development of paranormal belief, not least because it is one of the few variables that seems to correlate with the majority of the dimensions of belief.

In addition, people with fantasy-prone characteristics are likely to have high imaginative abilities, frequent episodes of HG/HP imagery, a high capacity for absorption, and also report a range of anomalous experiences.

There are a number of problems with the research into correlates of paranormal belief: the correlational and cross-sectional nature of most of the studies makes it difficult to establish causality; most of the research has only looked for bivariate relationships and does not control for the effects of other variables; there has been little theory guiding this research or specific explanations for the findings; researchers have used a variety of different measures of experience and beliefs. However, researchers have recently begun to test specific models containing variables that are believed to contribute to the development of anomalous beliefs and these models have been tested using multivariate techniques. These models, and others that are to be tested as part of this thesis, plus the rationale behind them will be discussed in the following chapter.

Chapter 3

Models of the development of anomalous/paranormal beliefs

Recent research has begun to focus on possible childhood antecedents of anomalous beliefs and experiences, such as childhood trauma and fantasy proneness (Irwin, 1992, 1993a; Lawrence et al., 1995; Lawrence, 1998; Lynn & Rhue, 1987; Wilson & Barber, 1983). In order to try to make more sense of what these relationships mean and what their exact nature is, possible models of the structure of these relationships have been developed.

Basically, two main models of the relationship between individual characteristics and paranormal experience and belief measures have been proposed (Irwin, 1992, 1993a; Lawrence et al., 1995; Lawrence, 1998). Fantasy proneness is a key component of both models but the models differ in their prediction of whether fantasy proneness has a direct relationship with paranormal beliefs, in addition to its indirect relationship via paranormal experience. Irwin's model (1992, 1993a) predicts that there is such a direct relationship but Lawrence's model (Lawrence et al., 1995; Lawrence, 1998) predicts that fantasy proneness can only influence beliefs indirectly via its influence on paranormal experience. Irwin's model (1992, 1993a) also differs from Lawrence's in that it proposes a mutually reinforcing relationship between paranormal experience and belief whereas Lawrence's model proposes that only experience influences beliefs. Chapter 2 has already shown that the nature of the relationship between anomalous experiences and beliefs continues to be a source of much debate and different explanations have been proposed to account for it. More information concerning the nature of these models will be presented in the following section. This chapter will then introduce the competing models that are to be tested as part of this thesis and will explain the rationale behind the addition of measures of the childhood incidence of hypnagogic/hypnopompic and sleep-related experiences.

Irwin's model of the origins and functions of paranormal belief

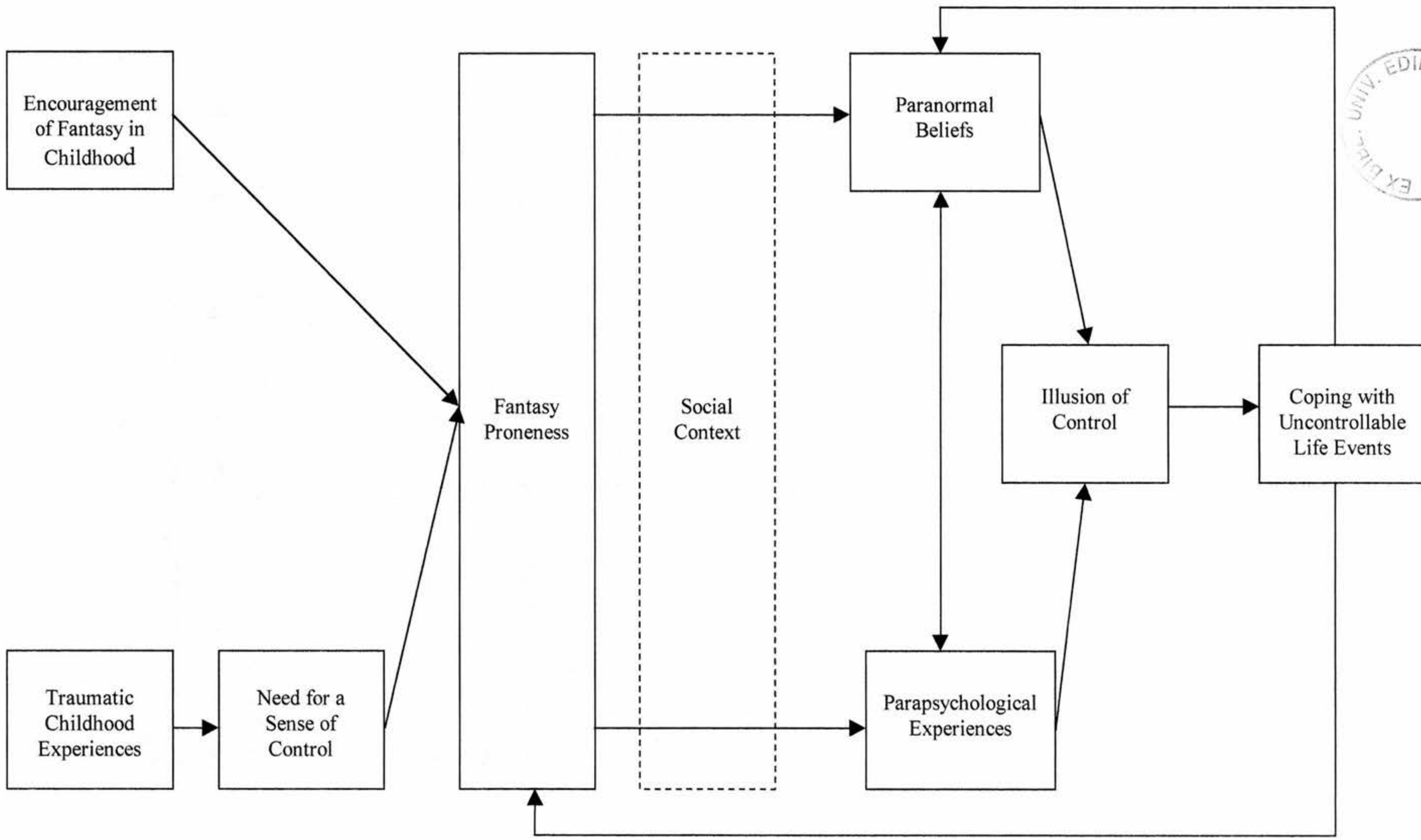
Irwin's diagram (1993a) of his model of the origins and functions of paranormal belief (see Figure 1) shows that the concept of fantasy proneness is clearly a central component.

Irwin's model proposes that the development of fantasy proneness is influenced by both positive and negative childhood experiences. This proposal is supported by previous research, based upon interviews and surveys, that has indicated that creative or artistic pursuits at an early age (Irwin, 1992, 1993a; Lynn & Rhue, 1987, 1988; Wilson & Barber, 1983), encouragement to fantasise from significant others, childhood isolation and loneliness, and traumatic experiences (e.g., emotional, physical or sexual abuse) can all contribute to the development of fantasy-prone characteristics (Bryant, 1995; Irwin, 1992, 1993a; Lynn & Rhue, 1987; McClenon, 1994b; Rhue & Lynn, 1991; Rhue, Lynn, Henry, & Buhk, 1991; Wilson & Barber, 1983).

Why should such childhood experiences lead to the development of fantasy proneness? Irwin (1992, 1993a) proposes that traumatic childhood experiences, particularly physical abuse, lead to a need for a sense of control over what happens in one's life, which in turn leads to the development of fantasy prone characteristics. In support of this, research has found that people who have experienced a lot of childhood trauma, such as emotional, physical or sexual abuse, can have a higher need for a sense of control (Irwin, 1993a) and tend to report higher levels of fantasy proneness (Bryant, 1995; French & Kerman, 1996; Rhue et al., 1991; but not Rauschenberger & Lynn, 1995).

Irwin argues that fantasy proneness leads to the development of paranormal beliefs because they may provide the individual with an illusion of control over, and a sense of being able to cope with, various life events, particularly anomalous ones. My suspicion is that fantasy proneness does not lead directly to the development of paranormal beliefs but it may influence them indirectly via its relationship with other variables such as anomalous experiences.

Figure 1 Irwin's model of the origins and functions of paranormal belief



The possible existence of anomalous processes and agencies may threaten a person's sense of understanding and serve as a reminder that the world can sometimes be uncertain and beyond individual control (Irwin, 1993a). Other commentators agree that humans have a basic need for a sense of understanding of life events (e.g., Alcock, 1981; Schumaker, 1990; Zusne & Jones, 1982) so Irwin's proposal does seem plausible.

Other researchers also concur with the suggestion that fantasy proneness develops as a coping mechanism (either adaptive and/or defensive) for dealing with unpleasant childhood circumstances (Lynn & Rhue, 1987,1988; Rhue & Lynn, 1991; Rhue et al., 1991; Wilson & Barber, 1983), and that this coping mechanism is also linked to a need for a sense of control. One way of dealing with trauma is to withdraw into one's self and either pretend that the unpleasant events are not happening and/or immerse one's self in an alternative fantasy life that is much more pleasant and diverts attention away from real-life. It is easy to see how this could lead to the development of a fantasy prone personality. However, one should not forget that positive factors, such as spending a lot of time engaging in artistic and creative activities and being encouraged to do this and also to fantasise, can also lead to the development of fantasy proneness (e.g., Irwin, 1992, 1993a; Lynn & Rhue, 1987, 1988; Wilson & Barber, 1983).

Irwin (1993a) cited a couple of studies that are supportive of his proposal that paranormal belief provides a sense of control. Using a computerised coin-tossing task, Blackmore and Troscianko (1985) found that, regardless of actual degree of control, believers in ESP thought they had a greater control over the outcome of the coin tosses than disbelievers. Obviously, this finding may not necessarily generalise to other dimensions of belief. However, Irwin (1992) also found that measures of the need for interpersonal control were positively correlated with global paranormal belief scores.

Apart from a direct positive relationship between fantasy proneness and paranormal belief, Irwin's model also predicts a direct positive relationship between fantasy proneness and a measure of parapsychological experiences. These parapsychological experiences may or may not involve genuine paranormal processes;

the engagement in vivid fantasising and occasional difficulties with reality discrimination may lead to misinterpretations of imaginary experience or perhaps the enhanced imaginary and absorption abilities associated with fantasy proneness are somehow conducive to anomalous processes or allow access to anomalous agencies. In addition, Irwin's model proposes that the extent to which parapsychological experiences and paranormal beliefs are reported may be mediated by the social context in which a person finds him/herself.

There is a great deal of empirical evidence for the positive relationship between fantasy proneness and global measures of paranormal experiences (Alvarado & Zingrone, 1994; Council & Huff, 1990; Lawrence et al., 1995; Lawrence, 1998; Rao, 1992) or measures of specific experiences, such as out-of-body experiences (Alvarado & Zingrone, 1994; Hunt, Gervais, Shearing Johns, & Travis, 1992; Myers, Austrin, Grisso, & Nickeson, 1983; Myers & Austrin, 1985; Wilson & Barber, 1983), ESP and healing abilities (Wilson & Barber, 1983), apparitional experiences (Cameron & Roll, 1983; Campbell, 1987, 1992; Myers & Austrin, 1985; Osis, 1986) and UFO experiences (Bartholomew et al., 1991; Powers, 1991; Wilson & Barber, 1983). The typical correlation is $r = 0.3\text{-}0.5$ (range .21-.57). However, it should also be noted that individuals who report anomalous experiences, such as UFOs and NDEs, have not always been found to be more fantasy prone than controls (Ring & Rosing, 1990; Rodeghier, 1994; Rodeghier et al., 1991; Spanos et al., 1993). Nevertheless, Appelle, Lynn & Newman (2000) concluded that it's too early to rule out a relationship between fantasy proneness and alien abduction experiences because studies in this area to date have methodological limitations, and participants may be tempted to give socially desirable responses and to avoid endorsing some fantasy proneness items because they associate them with abnormality.

There is also biographical evidence to suggest that at least three well-known mediums, Leonore Piper, Gladys Leonard, Eileen Garrett, and a number of UFO abductees and contactees, all possessed typical fantasy-prone characteristics (Rhue & Lynn, 1991; Roll, 1982; Wilson & Barber, 1983).

Although it is not specified in Irwin's model, it is possible that traumatic experiences might also be directly related to reports of anomalous experiences, either instead of or in addition to its relationship via fantasy proneness. Evidence from a number of different studies suggests that people who report certain anomalous experiences, such as UFOs, NDEs, OBEs, and déjà vu, also demonstrate a slight tendency to report higher levels of childhood trauma, such as intra- or extra-familial sexual abuse, death or serious illness relating to a friend, physical abuse and/or periods of isolation from friends (Irwin, 1993b, 1994b, 1996; Lawrence et al., 1995; Ring & Rosing, 1990; Ross & Joshi, 1992). However, contrary to Ring and Rosing (1990), Irwin (1993b) found that only certain types of trauma—such as, assault by a stranger, extrafamilial sexual abuse, separation by injury, illness, or death of a close personal friend—strongly discriminated between NDE experients and non-experients. There is also some evidence that adolescents and adults who have experienced a difficult and/or traumatic childhood report higher levels of paranormal beliefs (French & Kerman, 1996; Irwin, 1994b). However, the magnitude of the effect sizes in these studies shows that not everyone who believes in anomalous phenomena or who reports a personal anomalous experience has necessarily had a traumatic childhood.

As noted in Chapter 2, a number of studies, using a variety of measures, have found small to medium correlations between global and/or specific measures of experience and belief ranging from $r = .32$ to $r = .69$ (Atkinson, 1994; Gallagher, et al., 1994; Glicksohn, 1990; Irwin, 1985a; Lawrence, 1998; Lawrence et al., 1995; McClenon, 1994a; Murphy & Lester, 1976; Pekala et al., 1995; Thalbourne, 1994b; Willging & Lester, 1997). Irwin hypothesises a mutually-supportive interaction between paranormal beliefs and parapsychological experiences; beliefs may lead to an increased likelihood of attributing experiences to paranormal processes or agencies, and experiences interpreted as being paranormal may lead to the development or reinforcement of paranormal beliefs. However, alternatively, it could be that paranormal beliefs are best modelled as a consequence (experiential source explanation) or as an antecedent (cognitive source explanation) of anomalous experiences, as outlined in Chapter 2.

Finally, Irwin's model proposes that if paranormal beliefs do provide a sense of being able to control and cope with unpredictable or uncontrollable life events, then this may reinforce the fantasy prone characteristics and also the strength of paranormal beliefs.

However, there is a problem with Irwin's (1993a) model; although he cited a number of studies that supported various component parts of his model, he did not provide any evidence to support the model as a whole. For example, the various bivariate relationships cited may not necessarily hold once the effects of other variables are taken into account. Fortunately, multivariate statistical techniques do allow models to be tested to see if they can provide an acceptable fit to empirical data.

The use of structural equation modelling to test models of the structure of relationships between variables

Lawrence et al. (1995) set out to test a simplified version of Irwin's model using a relatively new statistical analysis technique known as 'structural equation modelling (SEM), or 'covariance structure modelling'. SEM techniques are often referred to as 'causal modelling' techniques but this term should be avoided as it may encourage incorrect inferences of causality (Bullock et al., 1994; Hoyle, 1995). Before we can consider Lawrence's findings, it is necessary to give a brief introduction to structural equation modelling.

A model is simply a representation or description of the structure or system of relationships between component variables and/or factors. Structural equation modelling is a useful tool for testing competing models and theories (Hair et al., 1998, p. 578; Neill et al., 1999, p. 167) and can determine whether hypothesised models of the linear relationships among a number of variables (either observed and/or latent) fit a sample of data to an acceptable extent (e.g., Hoyle, 1995; Maruyama, 1998; Schumacker & Lomax, 1996).

SEM essentially combines factor analysis, multiple regression, and path analysis techniques. However, SEM differs from the aforementioned techniques in that a precise model must be formally stated before the analysis can be run (Hoyle, 1995, p. 13; Hair et al., 1998, p. 590; Neill et al., 1999).

One of the advantages of SEM is that it can take into account the influence of several predictors simultaneously. Secondly, it is possible to test competing models using the same data in order to see which one fits the data best. Nevertheless, although a given model may fit the data, it is important to note that there may be other models which might fit the data equally well, or perhaps even better, (Breckler, 1990; Bullock et al., 1994). Thus, the finding that a proposed model fits the data simply means that it provides a good description of the relationships among the variables (Bullock et al., 1994; MacCallum, 1995). Although SEM methods cannot establish causality, they do force the researcher to produce clear and precise models of the structure of the relationships; the results of testing these models can give useful suggestions regarding the plausibility of causal relationships and competing models (Maruyama, 1998, pp.35), and these can then be validated using other methods.

SEM procedure

In terms of sample sizes, approximately 100-150 cases are considered to be a minimum for SEM (see Schumacker & Lomax, 1996) and 200 cases is considered by some researchers (e.g., Neill et al., 1999) to be an optimal sample size.

Most SEM analyses consist of five different steps: 1) model specification, 2) identification, 3) estimation, 4) testing fit, and 5) respecification (Bollen & Long, 1993).

1. Model specification

Ideally, the specified model should be based on a thorough review of the empirical literature (Schumacker & Lomax, 1996) or should be derived from practical experience (Neill et al., 1999, p. 168). Such models are expressed in terms of independent variables (IVs) and dependent variables (DVs). Hypothesised relationships between a number of IVs and each DV are expressed in the form of linear structural equations, for example:

$DV_1 = b_1\ IV_1 + b_2\ IV_2 ... + b_n\ IV_n + \text{error}$

$DV_2 = b_1\ IV_1 + b_4\ IV_4 ... + b_n\ IV_n + \text{error}$

etc.

b = a regression coefficient which indicates the direction and extent to which the DV changes as a function of this IV, whilst the influences of all other IVs in the equation are taken into account.

DVs, either observed or latent, are not expected to be perfectly accounted for by the IVs and so an error term is included in the equations (MacCallum, 1995; Ullman, 1996). The error may be due to random or systematic error or may be variance explained by other variables which are not specified in the model (MacCallum, 1995). Within the EQS software, an 'E' is used to denote an error term for an observed DV whereas a 'D' (for 'disturbance') is used to denote an error term for a latent variable. The variances and covariances among the IVs must also be specified.

Parameters stated in the model may either be 'fixed' or 'free'. Fixed parameters are not estimated from the data and are often believed to be zero; free parameters are estimated from the data and are believed to be non-zero (Hoyle, 1995). Initial start values for these free parameters can be specified by the researcher or can be provided by the computer software (Hoyle, 1995; Ullman, 1996). Within the specified models, straight arrows are used to denote potential 'causal' relationships; curved arrows denote correlations (Neill et al., 1999, p. 169).

2. Model identification

SEM attempts to solve for the linear equations, using a sample of data, and provide an optimal solution plus estimates of the various free parameters (i.e., regression coefficients, covariances and variances). In order to do this, there must be more data points than parameters to be estimated (see Ullman, 1996, p. 743). If this is true then the model is 'overidentified;' if there are fewer data points than parameters, the model is 'underidentified'; if there are the same number, the model is 'just identified' (Chou & Bentler, 1995). Identification problems can occur when there are large numbers of parameters to be estimated in the model relative to the number of covariances or correlations (Neill et al., 1999).

3. Estimation of parameters

The estimation process begins with the substitution of a set of initial start values into the structural equations. The SEM process calculates one or more possible solutions to the structural equations until it reaches a solution with the smallest possible difference between the variance-covariance matrix implied by the model and the actual sample variance-covariance matrix[2]. This estimation process may require a number of different attempts, or iterations, before it converges on an optimal solution.

A number of estimation techniques are available: e.g., Generalized Least Squares (GLS), Maximum Likelihood (ML), Elliptical Distribution Theory (EDT), and Asymptotically Distribution Free (ADF). The χ^2 test statistic obtained from the various estimation techniques can be affected by a number of factors, such as sample size, nonnormality of the distribution of factors and/or errors, and violation of the assumption of independence. For information on the performance of various estimation techniques under a variety of conditions, see Hu, Bentler, and Kano (1992). The ML estimation technique, particularly the Scaled version, seems to be one of the most reliable and the most widely used, partly because it has been found to provide valid results even with small samples and when there may be nonnormality and/or possible dependence among factors or error terms (Hair et al., 1998; Ullman, 1996).

4. Testing of model fit

The optimal solution produced by the estimation process provides a discrepancy or fitting function, which is a measure of the discrepancy between the implied and the actual sample covariance matrices. If the hypothesised model provided a perfect fit to the data then the discrepancy function would be zero and the residual matrix (which contains the differences between the variances and covariances in the implied and sample matrices) would contain a series of zeros.

---

[2] It is assumed that the sample variances and covariances are good estimators of the population variances and covariances.

The value of the discrepancy or fitting function is then used to calculate a χ^2 goodness-of-fit test statistic and other indices of fit (Hoyle, 1995). The critical value of χ^2 with the appropriate degrees of freedom is then consulted. A χ^2 value greater than the criterion value indicates that there is a significant difference between the covariance matrix implied by the model and the sample covariance matrix, i.e., the hypothesised model does not provide a good fit to the data. A nonsignificant χ^2 goodness-of-fit statistic suggests that the model does provide an acceptable fit to the sample of data; a value of zero would indicate a perfect fit (Hoyle, 1995).

Because χ^2 values depend on sample sizes, differences between the implied and the sample matrices are more likely to be significant with large sample sizes (Ullman, 1996). For this reason, other more descriptive indices of fit have been devised. There are three main types of fit indices: absolute, incremental, and parsimonious (Hair et al., 1998, p. 611). Unfortunately, fit indices are not statistics and so significance testing cannot be performed (Hoyle, 1995). The main fit indices can be categorised as either absolute or relative/incremental (Hu & Bentler, 1995; Maruyama, 1998). Absolute indices basically ask "Is the residual or unexplained variance remaining after model fitting appreciable?" (Maruyama, 1998, p. 239). Absolute indices (e.g., GFI) directly assess how well the model fits the data without reference to a null model. Relative/incremental indices (e.g., NFI) consider the improvement in fit obtained by using the proposed model rather than a null model. The null model is usually one that assumes that none of the variables are correlated (Maruyama, 1998). Relative indices basically ask "How well does a particular model do in explaining a set of observed data compared with (a range of) other possible models?" (Maruyama, 1998, p. 239). Finally, adjusted or parsimonious fit measures can give an indication of parsimony because they make adjustments for the number of estimated parameters in the model (Hair et al., 1998) and they value models with relatively small numbers of free parameters (Maruyama, 1998).

Generally speaking, fit indices need to be greater than or equal to 0.9 in order to conclude that the model provides a sufficiently good fit to the data (Hoyle & Panter, 1995), although this criterion does not work equally well with all indices , sample sizes, estimators or distributions (Hu & Bentler, 1995). It is important to point out that smaller values of χ^2 indicate a greater fit whereas larger values of fit indices generally indicate a greater fit. Researchers are generally encouraged to use more than one measure of fit, and preferably more than one type too (Hair et al., 1998; Hoyle, 1995), because there is some ambiguity as to the potential effects of certain sample and model characteristics on the different measures of fit.

Relationships among variables in SEM

As Hoyle (1995) points out, there are three types of relationship between variables within SEM: 1) association, 2) direct 'effect', 3) indirect 'effect'.

> The *association* is a relation between two variables treated within the model as nondirectional....The *direct effect*...is a directional relation between two variables....The *indirect effect* is the effect of an independent variable on an dependent variable through one or more intervening, or mediating variables... (pp. 3-4).

Models in which all of the relationship arrows point in the same direction are known as non-reciprocal or recursive models; models in which there are reciprocal relationship arrows and/or feedback loops are known as reciprocal or non-recursive (Maruyama, 1998; Schumacker & Lomax, 1996). Although useful, reciprocal models can be more difficult to solve than non-reciprocal models (Maruyama, 1998).

Having established that a model provides an acceptable global fit to the data, it is necessary to look at the specific elements within the model, i.e., the estimated free parameters such as the regression coefficients, and to assess the extent to which they are reliably different from zero (Hoyle, 1995). The ratio of an estimate to its standard error provides a z statistic that can be evaluated for statistical significance. Standardised regression coefficients are often interpreted, rather than the unstandardised versions, because there are no differences in scales (Ullman, 1996).

5. Respecification of the model

Modification, or re-specification, of a model is a controversial aspect of SEM (Hoyle, 1995, p. 8). Models are often modified either to improve the fit or to test hypotheses

(Breckler, 1990; Ullman, 1996). In the former case, this is often done following an inspection of the parameter estimates, the residual matrix, or statistical tests, such as the Wald and the Lagrange Multiplier (Hoyle, 1995).

The danger of making too many suggested modifications to a model is that the model moves to fit the data rather than vice versa (Bullock et al., 1994). As Hair et al. (1998, p. 611) quite rightly point out, "In developing any statistical model, the researcher must guard against "overfitting" the model to the data." In addition, using the same set of data to develop and evaluate a model undermines the confirmatory logic of SEM (Breckler, 1990). Any post hoc adjustments to a model should be replicated and/or cross-validated on other data samples (Bullock et al., 1994; MacCallum, 1995; Neill et al., 1999). Post hoc modifications on samples of 100-400 should not be taken seriously unless they are replicated in another sample (Hoyle & Panter, 1995). It is further recommended that researchers should deliberately consider (Hair et al., 1998) the plausibility of post hoc modifications, avoid those that make no sense and offer explanations for those that do (Hoyle & Panter, 1995).

Test of Irwin's model of the development of paranormal belief

Lawrence et al. (1995) set out to test a simplified version of Irwin's model (see Figure 2) that focused on two childhood factors: childhood trauma and childhood fantasy proneness.

A questionnaire, including Council and Edwards (1987) Survey of Traumatic Childhood Experiences (STCE) scale, the Australian Sheep-Goat Scale (ASGS, Thalbourne & Delin, 1993) and a measure of childhood fantasy based on Myers (1983) version of ICMI, was administered to students (and their friends) at the University of Edinburgh. The resulting sample of 80 participants was analysed using structural equation modelling (SEM) techniques.

The results of the SEM analysis indicated that the simplified model did not provide a good fit to the data ($\chi^2 = 5.54$, df = 2, $p = 0.0625$, Bentler-Bonnett non-normed fit index = 0.77). The EQS software (Bentler, 1989) suggested that excluding a direct link between childhood fantasy and paranormal belief and adding a direct link between childhood trauma and paranormal experience would provide a better fit to the data. This revised model (see Figure 3) did provide an excellent, and statistically acceptable, fit to the data ($\chi^2 = 1.31$, df = 2, $p = 0.520$, Bentler-Bonnett non-normed fit index = 1.05) (Lawrence et al., 1995).

The results of Lawrence et al.'s analysis suggested that a model that proposes that childhood fantasy proneness does not have a direct influence on the development of paranormal beliefs provided a better fit to the data. Lawrence et al.'s (1995) revised model also suggests that childhood trauma may have a direct influence on paranormal experiences, regardless of its association with the development of fantasy proneness. Following a post hoc examination of the data, Lawrence (1998) suggested that one possible explanation for this direct link might be that, in some cases, bereavement-related trauma leads to a strong desire for the return of the deceased, which may lead to hallucinations of their presence.

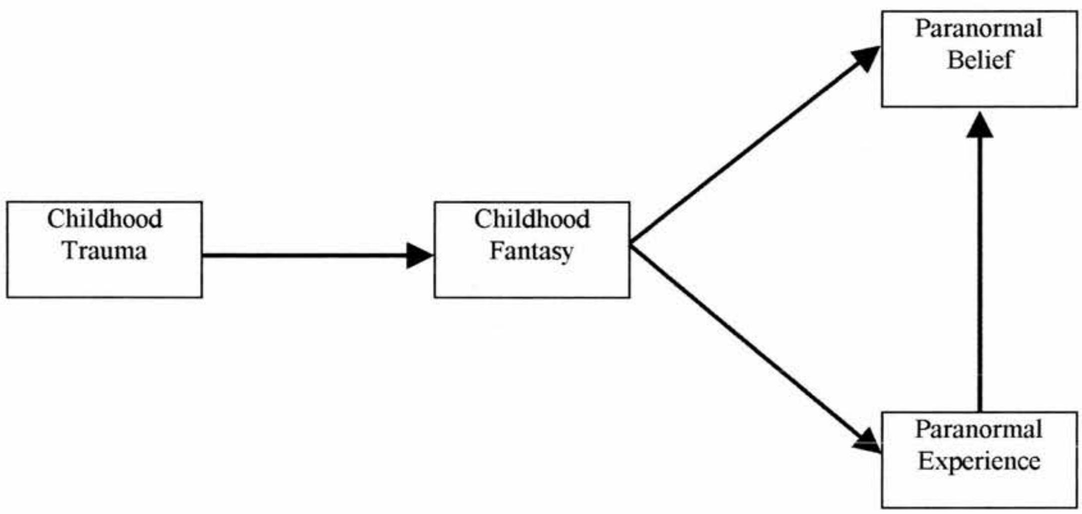


Figure 2 Version of Irwin's model which was tested by Lawrence et al. (1995)

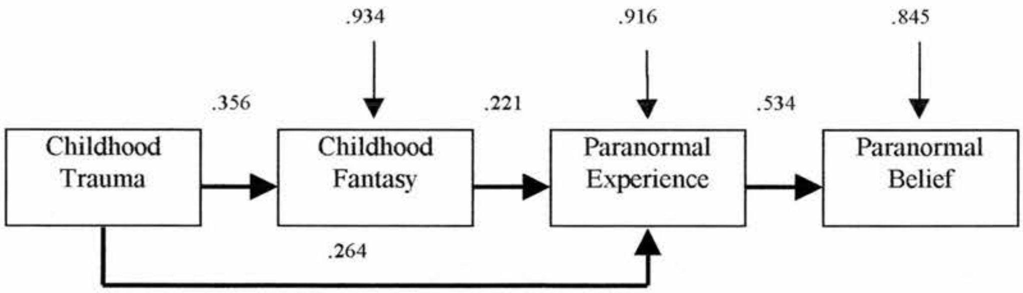


Figure 3 Revised model proposed by Lawrence et al. (1995) following SEM analysis of version of Irwin's model

The magnitude of the standardised path coefficients was generally quite small, with the exception of the path coefficient for the relationship between paranormal experience and paranormal belief (0.534). This, coupled with the magnitude of the error terms, suggests that the model can only account for relatively small proportions of variance in the predicted variables. For example, Lawrence's model accounted for only 16% of the variance[3] in the paranormal experience measure and 29% of the variance in the paranormal belief measure. Clearly other variables not specified in the model must also be involved. However, Lawrence was only testing a simplified version of Irwin's model that did not include measures of control, coping or encouragement to fantasise.

This finding with regard to the relationship between paranormal experience and belief may be a key one, as Lawrence et al. (1995) pointed out:

> Also, our new model shows that PB [paranormal belief] is best modelled as a consequence, rather than a cause, of PE [paranormal experience]. This is an important result, if it can be substantiated by further research on larger samples, precisely because Irwin's original model is equivocal with respect to the effects of fantasy on PB and PE, and PB and PE themselves are supposed to show reciprocal causation with one another. If, as our model suggests, PE experience is more the result of fantasy proneness, and PB is more the result of PE, then this suggests a more phenomenological explanation for PB, over a more attributional one (i.e. that one has PB and then attributes paranormality to hallucinatory experiences). In short, where PE has previously been considered the younger brother to PB, our research suggests that it is more the 'paternal cause' of PB. (p. 214).

[3] For non-reciprocal models such as this one, the proportion of variance in any given dependent variable equals $1\text{-}E^2$ where E is the error term in the structural equation for that dependent variable.

There is no disputing the fact that Lawrence et al.'s (1995) model supports the experiential source explanation for the relationship between paranormal experience and beliefs but alternative models with different paths between the experiences and beliefs measures might also have fitted their data. It is not clear why they did not test a version of Irwin's model that included the mutually reinforcing relationship between paranormal experience and paranormal belief given that it is possible to test such reciprocal or nonrecursive models using SEM (Maruyama, 1998, pp. 100-105; Schumacker & Lomax, 1996, pp. 162-164) and, more specifically, with the EQS software that they used. It is important to note too that Lawrence et al.'s (1995) was based on a relatively small sample for this kind of analysis technique and that the results do <u>not</u> suggest that this is the only acceptable model.

Lawrence (1998) conducted two further surveys on different samples in order to try to replicate and extend his findings and to confirm his proposed model as he was concerned that his revised model may have capitalised on chance relationships. The first replication attempt was based on a sample of 58 members of the Society for Psychical Research (SPR); the second on a random sample of 129 Edinburgh residents. These surveys differed from the initial study in that paranormal belief was analysed as a latent variable, i.e., a general factor based on scores from two separate

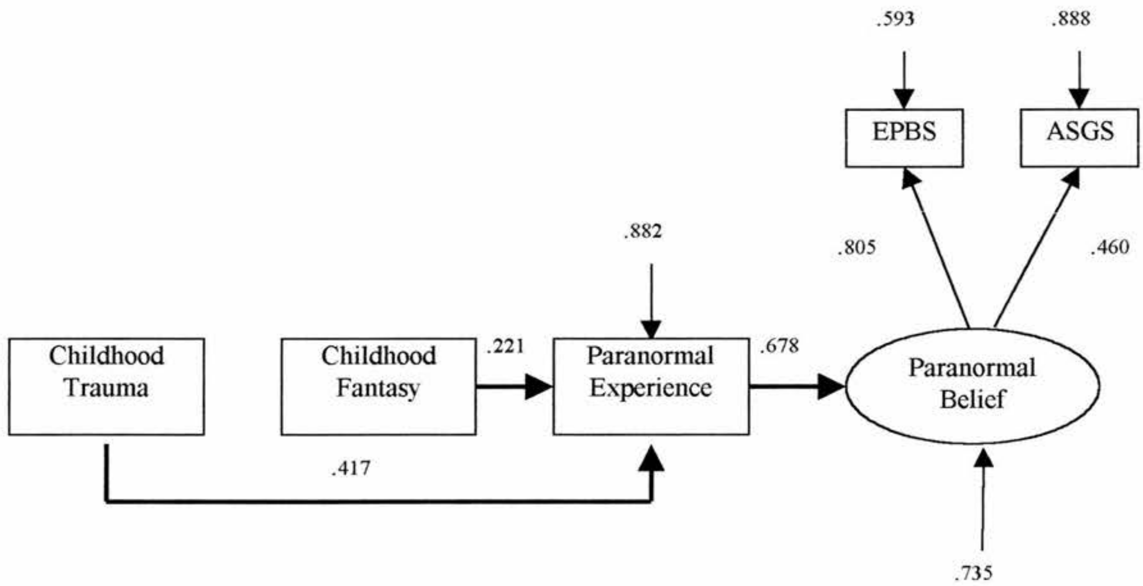


Figure 4 Revised model proposed by Lawrence (1998) – SPR sample

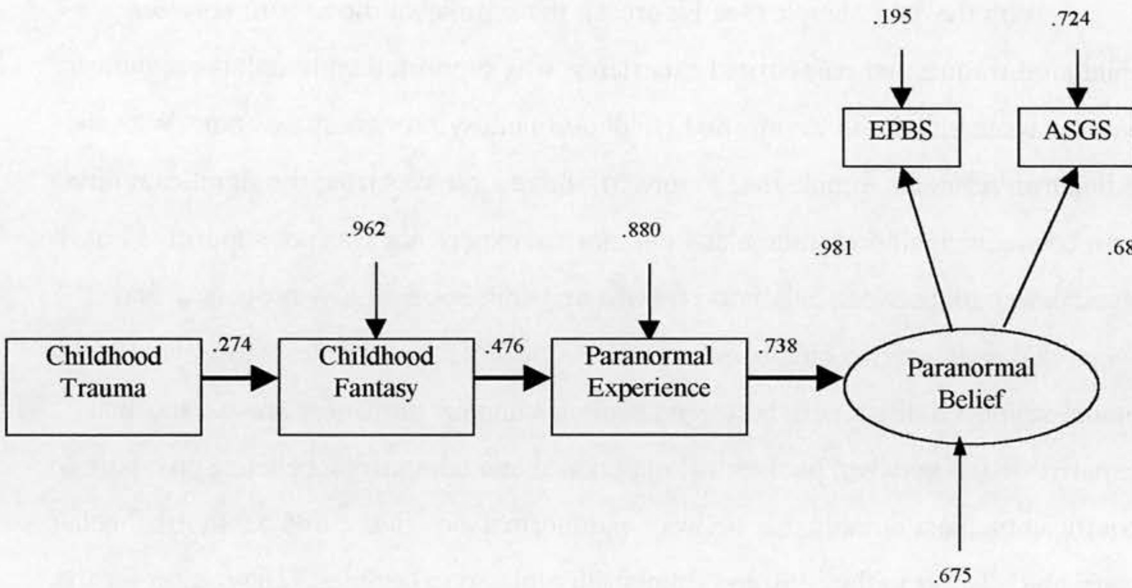


Figure 5 Revised model proposed by Lawrence (1998) – Edinburgh sample

paranormal belief measures (items from ASGS-B, Thalbourne & Delin, 1994; Edinburgh Paranormal Belief Scale (EPBS), Lawrence, 1998).

Lawrence's revised model provided a good fit to the data in both samples (SPR--$\chi^2 = 6.86$, df = 5, $p = 0.2309$, Bentler-Bonnett non-normed fit index = 0.968; Edinburgh--$\chi^2 = 5.07$, df = 5, $p = 0.4075$, Bentler-Bonnett non-normed fit index = 0.999), though if one compares Figures 4 and 5 with Figure 3 one can see that not all of the predicted pathways (i.e., those omitted from Figures 4 and 5) were of a statistically significant magnitude. Another criticism of Lawrence's (1998) analyses is that these nonsignificant paths are not shown on his final path diagrams and this may mislead the reader into thinking that these paths were not part of the model that was tested. It is better to show all of the paths in the model in the final path diagram and to differentiate between those that are of a statistically significant magnitude and those that are not.

The simplified version of Irwin's model did not provide an acceptable fit to the data from the SPR sample ($\chi^2 = 15.65$, df = 4, $p = 0.0035$, Bentler-Bonnett non-normed fit index = 0.372) but did for the Edinburgh sample ($\chi^2 = 5.03$, df = 4, $p = 0.2844$, Bentler-Bonnett non-normed fit index = 0.988), though Lawrence's model was the more parsimonious of the two.

With the SPR sample (see Figure 4), the significant direct path between childhood trauma and paranormal experience was supported, although the significant path between childhood trauma and childhood fantasy proneness was not. With the Edinburgh residents sample (see Figure 5), the reverse was true; the significant direct path between childhood trauma and paranormal experience was not supported but the significant path between childhood trauma and childhood fantasy proneness was.

Overall, leaving childhood trauma to one side, the three tests of Lawrence's model support a direct path between childhood fantasy proneness and paranormal experience and between paranormal experience and paranormal belief. Some path coefficients, most notably that between paranormal experience and paranormal belief, were much larger in the SPR and Edinburgh replication samples. The reason for the larger experience-belief coefficient may be that combining more than one measure to form a latent factor minimises the overall measurement error thus leading to a more accurate measure; this may have provided a greater proportion of 'true' variance to be explained.

Thus, tests of the simplified version of Irwin's model and Lawrence's proposed model support the proposed direct relationships between fantasy proneness and paranormal experiences and between paranormal experience and paranormal beliefs. Contrary to Irwin's model, there was no support for a direct relationship between fantasy proneness and paranormal beliefs. However, as noted earlier, Lawrence did not actually test a version of Irwin's model that included Irwin's predicted reciprocal direct relationship, so it is not clear whether this would also fit, nor did he test another alternative model that would test out the cognitive source explanation, i.e., that paranormal belief causes more frequent reports of paranormal experiences. There is also evidence from two of the three samples that suggests an additional direct relationship between childhood trauma and paranormal experience.

Thus, a main aim of this thesis is to test more fully the competing models of the relationships between childhood fantasy proneness, anomalous experience and anomalous beliefs. Tests of these models will attempt to confirm whether childhood fantasy proneness can be better modelled as having a direct relationship with a measure of anomalous beliefs as well as an indirect relationship via its relationship with anomalous experiences or whether it can be better modelled as only having the latter indirect relationship (see Figure 6).

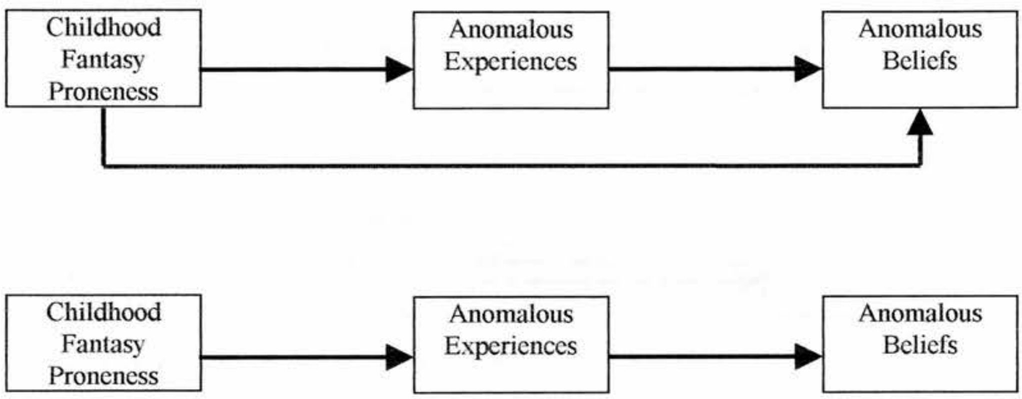


Figure 6 Competing models of the relationship between childhood fantasy proneness and anomalous beliefs

The tests will also establish whether anomalous experiences can be better modelled (see Figure 7) as having a direct antecedent relationship with anomalous beliefs (experiential source explanation), as having a direct consequent relationship (cognitive source explanation) or whether there should be a direct reciprocal relationship between them (reciprocal causality explanation).

In addition, the competing models to be tested will also include measures of the childhood incidence of hypnagogic/hypnopompic experiences, sleep experiences, and symptoms of selected sleep disorders. It is predicted that these variables will have a direct positive relationship with a measure of anomalous experiences.

The rationale for the inclusion of these additional variables will be outlined in the following section.

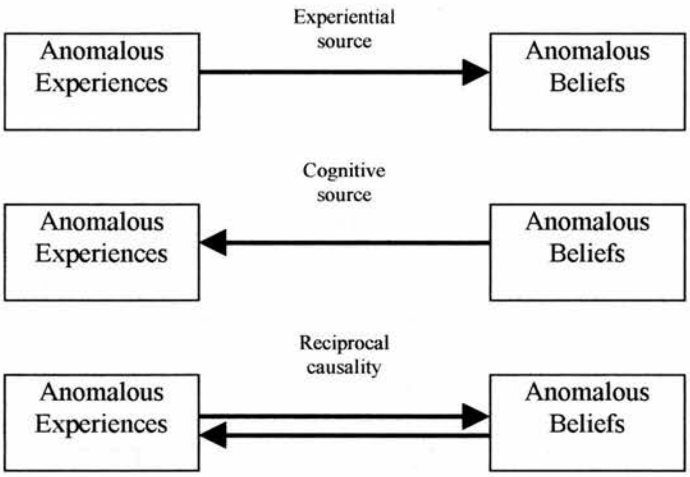


Figure 7 Competing explanations for the relationship between reports of anomalous experiences and anomalous beliefs

Relationship between fantasy proneness and experiences reported during altered states of consciousness

The proposition is that people with fantasy prone characteristics may find it easier to enter altered states of consciousness (ASCs) and once in these ASCs they may become very absorbed in the experiences associated with them and are more likely to have a vivid recall of such experiences at a later date. More specifically, it is proposed that childhood fantasy proneness will be positively correlated with the frequency of childhood experiences associated with sleep-related states of consciousness. It is also proposed that adults who report that they had a higher frequency of these sleep-related experiences during childhood will tend to report a higher frequency of anomalous experiences throughout their lifetime.

The finding that stimulated my interest in this area was Wilson and Barber's (1983) discovery that 64% of their fantasy-prone group reported that they experienced hypnagogic/hypnopompic imagery on a regular basis (possibly since early childhood) compared with only 8% of the control group. Wilson and Barber (1983) also reported that many of these individuals felt as if they were seeing something external that really existed or that they were looking into another dimension. Wilson and Barber (1983, p. 365) concluded that:

> [T]here may be a close relationship between fantasy proneness; ability to fantasize with hallucinatory vividness equally well with eyes open or closed; frequently experiencing vivid hypnagogic images; and perceiving spirits, ghosts, or apparitions. We believe that research that probes much more intensively into the relationships among these variables will go far toward explaining what kinds of individuals report perceiving ghosts or apparitions and what conditions are most conducive to such experiences.

In my opinion, the relationship between fantasy proneness, hypnagogic/hypnopompic experiences and reports of anomalous experience is an important one and warrants further investigation because it suggests that ASCs, and the ability to experience, generate and become absorbed in internal events, might facilitate the operation of anomalous processes and/or lead to misinterpretation of normal experiences. However, although there has been much research into the relationship between fantasy proneness and anomalous experiences, and there is an increasing amount of research into the relationship between hypnagogic/hypnopompic and anomalous experiences, very few studies have considered both fantasy proneness and hypnagogic/hypnopompic experiences together. Interestingly, in one of the few studies that has empirically considered fantasy proneness and hypnagogic/ hypnopompic imagery together, a cluster analysis of Rodeghier's (1994) sample of alien abductees revealed two groups of cases, one of which reported much higher fantasy proneness and was much more likely to have experienced hypnagogic/hypnopompic imagery.

In my opinion, hypnagogic/hypnopompic experiences provide some of the best evidence for the experiential source explanation for anomalous beliefs. Evidence and possible explanations for the link between the HG/HP and sleep states and reports of anomalous experiences and beliefs will be discussed in Chapter 5.

Further evidence to suggest that people with fantasy prone characteristics may find it easier to enter ASCs, and to become highly absorbed in them, comes from research that has found that fantasy proneness, hypnotic susceptibility, dissociative tendencies and absorption are all related to each other to some extent (Barrett, 1992; Council & Huff, 1990; Kihlstrom, Glisky, & Angiulo, 1994; Lynn & Neufeld, 1996; Lynn & Rhue, 1988; Myers & Austrin, 1985; Rauschenberger & Lynn, 1995; Rhue & Lynn, 1989, 1991; Rhue, Lynn, & Sandberg, 1995; Siuta, 1990; Spanos et al., 1995). People who score highly on one or more of these aforementioned variables are also more likely to report anomalous experiences, such as ESP (see Irwin, 1999, pp. 106-107), apparitions (see Irwin, 1994c, p. 60), OBEs (see Alvarado, 2000, Hunt et al., 1992; Myers et al., 1983; Wilson & Barber, 1983), NDEs (Greyson, 2000, pp. 320-321; Irwin, 1994c, p. 49, 1999, p. 212), memories of previous lives (see Mills & Lynn, 2000, p. 287), alien abduction experiences (see Appelle et al., 2000, p. 262; Bartholomew et al. 1991), and mystical experiences (see Wulff, 2000, p. 408).

There is also some suggestion that dissociative tendencies might be related to some specific sleep-related experiences. For example, it has recently been argued that dissociated states of consciousness can occur in and around the time of sleep; such states can be a mixture of wakefulness and REM or NREM sleep (Mahowald & Schenck, 1991). Examples of REM intrusions into wakefulness might include narcolepsy, episodes of hypnagogic/hypnopompic imagery and sleep paralysis. Examples of wakefulness intruding into REM sleep might include episodes of REM sleep behaviour disorder and lucid dreaming (Mahowald & Schenck, 1991). Examples of wakefulness intrusions into NREM sleep might include episodes of night terrors and sleepwalking. If fantasy proneness is positively correlated with dissociative tendencies then we would expect fantasy proneness to be correlated with the frequency of experiences that occur during these mixed sleep-wakefulness states as well. Thus, it is possible that people with fantasy prone characteristics will report more hypnagogic/hypnopompic imagery, sleep paralysis, lucid dreaming, and symptoms of narcolepsy, REM sleep behaviour disorder, sleep terrors and sleepwalking. There may also be relationships with other dream experiences and symptoms of other sleep disorders. Such relationships are more likely to be apparent when considering childhood measures as there is evidence that hypnagogic/hypnopompic experiences (Leaning, 1925; Ohayon, Priest, Caulet & Guilleminault, 1996; Richardson, Mavromatis, Mindel, & Owens, 1981; Schacter, 1976) and certain sleep experiences and disorders may be more common during childhood and adolescence (e.g., Empson, 1993; Mindell, 1993). More details about the HG/HP and sleep states, and the experiences associated with them, will be provided in Chapter 4.

Apart from their association with the development of fantasy proneness, traumatic experiences have also been associated with a number of sleep disorders. Unresolved conflicts, stress, trauma, major life events, and post-traumatic stress disorder have been associated with a number of sleep disorders: nightmares, sleep terrors, sleep paralysis, sleep starts, bruxism, insomnia, and exploding head syndrome (American Sleep Disorders Association, ASDA, 1990; Bell, Dixie Bell, & Thompson, 1986a; Empson, 1993; Hartmann, 1984; Martinovic, 1993; Mills, 1994; Murray, 1991; Partinen, 1994; Sachs & Svanborg, 1991). This provides additional justification for the inclusion of measures of sleep-related experiences in models of the development of anomalous beliefs.

So, it seems that childhood trauma can lead to the development of fantasy proneness, dissociative tendencies, a capacity for absorption and also certain sleep-related experiences (some of which may be associated with dissociated states of consciousness). All of these variables have also been associated with reports of anomalous experiences. I am in agreement with Targ, Schlitz, & Irwin (2000, p. 228) who concluded that "Collectively, these findings [i.e., relationships among dissociative tendencies, hypnotic susceptibility, fantasy proneness, absorption] might be interpreted as suggesting that a capacity to enter altered states of consciousness is a factor in the predisposition to PREs [psi-related experiences]." The fact that all of these variables seem to be inter-related to some extent suggests that there might be a broader, more general factor that encompasses these variables. Indeed, two recently proposed constructs, boundary structure (Hartmann, 1991) and transliminality (Thalbourne & Delin, 1994), seem to encompass many of these characteristics.

My understanding of the constructs of boundary structure (Hartmann, 1991) and transliminality (Thalbourne & Delin, 1994), both of which encompass fantasy prone characteristics, suggests that people with thin boundaries and/or who are highly transliminal are likely to report more frequent hypnagogic/hypnopompic experiences (Thalbourne & Houran, 2000), dream experiences, and sleep disorder symptoms. The concepts of boundary structure and transliminality will be discussed in more detail in the following sections.

Boundary structure

Boundary structure is a fairly new dimension of personality that encompasses fantasy proneness, absorption, hypnotizability, openness and defensiveness (Hartmann, 1991). The following quotation from Hartmann's (1991) book 'Boundaries in the Mind: A New Psychology of Personality' provides a useful overview of the basis for this new dimension:

> When we consider the contents of our minds...we are speaking of parts, of regions, functions, or processes that are separate from one another and yet connected with one another. The boundaries between them are not absolute separations: they can be relatively thick or solid on the one hand or relatively thin or permeable on the other. (p. 4).

The concept of boundary structure arose out of a series of interviews with participants who reported lifelong histories of nightmares (but no other sleep-related problems). Hartmann (1991) discovered that this group shared a number of unusual characteristics that were not apparent in the control groups. For example, they were particularly open, sensitive, vulnerable and artistic, and had been so since early childhood; they also seemed to have flexible identities and relationships. Of particular interest, in relation to this thesis, is the finding that the nightmare sufferers reported that they often experienced periods in which they were half-asleep or half-awake. So it seems that these participants were prone to experiencing mixed states of consciousness involving sleep and wakefulness (Mahowald & Schenck, 1991). From these interviews with nightmare sufferers, Hartmann (1991) concluded that:

> The term that seemed best to encompass all this was that they had "thin boundaries" in many different senses. Everything in their minds seemed to flow together. They did not separate things out, nor did they have barriers or walls to separate themselves from the world. (p. 16).

Thus, people at one extreme would have boundaries that are thick and relatively impermeable, those in the middle would have some thick and some thin boundaries, and those at the other extreme would have thin and relatively permeable boundaries. For example, people with thick boundaries tend to focus on one thing at a time, can clearly differentiate between reality and fantasy, have a clear sense of self in relation to their environment whereas the reverse may be true for those with thick boundaries (Hartmann, Rosen, & Rand, 1998). Thin boundary individuals often have rich fantasy lives too and thus may share characteristics of fantasy-prone personalities.

Hartmann (1991, pp. 22-23) identified a number of different types of boundaries relating to perceptual boundaries, thoughts and feelings, states of awareness or states of consciousness, sleep-dream-wake boundaries, play, memory, one's physical body, interpersonal boundaries, boundaries between the conscious and unconscious, defense mechanisms, identity, group boundaries, organisation of one's life, environmental preferences, opinions and judgements, and decision making and action. Hartmann (1991) went on to develop the Boundary Questionnaire in an attempt to measure boundary structure.

Unfortunately, to date, very little independent work has been conducted to test out the validity of this theory. Research that has been conducted has tended to focus on the sleep-dream-wake boundaries (e.g., Cowen & Levin, 1995; Hartmann et al., 1998; Hicks, Bautista, & Hicks, 1999; Kunzendorf, Hartmann, Cohen, & Cutler, 1997; Schredl, Kleinferchner, & Gell, 1996).

I want to focus on two of the above types of boundaries: those related to altered states of awareness/consciousness and sleep-dream-wake boundaries. People with thin boundaries spend a lot of time daydreaming and fantasising, they find it easy to become absorbed in such activities and, in some circumstances, they find it difficult to distinguish between imagination and reality (there are definite parallels with fantasy proneness and absorption here) (Hartmann, 1991). People with thin boundaries also report relatively slow and gradual transitions between sleep and wakefulness, hypnagogic/hypnopompic imagery, dreams and lucid dreams. In addition, their dreams recall tends to be better (Cowen & Levin, 1995; Schredl et al., 1996), and their dreams tend to be more vivid, detailed, emotional and bizarre (Hartmann, 1991; Hartmann, Rosen, & Rand, 1998). Although Hartmann (1991) found that dream frequency was significantly correlated with thin boundaries ($r = 0.37$), nightmare frequency was surprisingly not correlated with it ($r = 0.04$). This may seem strange, considering that the concept of boundary structure emerged from interviews with chronic nightmare sufferers, but it is not given that this latter survey used items which would seem to have asked about the current number of nightmare episodes per year. Very few people experience nightmares beyond adolescence (ASDA, 1990), which could explain the lack of correlation. Research with adolescents has found that those with thin boundaries do, as expected, report more frequent nightmares and a greater nightmare disturbance than those with thick boundaries; other research has confirmed that people with thin boundaries are more likely to report nightmares, especially recurrent ones, during their childhood (Schredl et al., 1996).

In another study, 300 patients at a sleep disorder center were asked to complete the Boundary Questionnaire. Patients with sleep apnea, periodic limb movements, bruxism or night terrors scored thicker than average whilst other patients who suffered from nightmares scored thinner than average. There is also physiological evidence to suggest that people with thin boundaries experience far more sleep states that are difficult to classify as being either waking, REM or NREM sleep (Hartmann, 1991, p. 234).

Although there has been no attempt to confirm many of the boundary types devised by Hartmann (1991), research that has investigated the sleep-dream-wake boundary type has validated a number of Hartmann's predictions.

However, one should note that recent research suggests that people with thinner boundaries tend to report more psychic experiences ($r = 0.42$, $p < .001$) (Richards, 1996). In addition, it has been proposed that alien abductees probably have thin boundary personalities, or a boundary deficit as Kottmeyer (1988) describes it.

In summary, based on my analysis of the evidence and my own speculations, I would predict that children who have developed thin boundaries are likely to be fantasy-prone and to report HG/HP imagery, dream experiences and a number of sleep disorders, such as nightmares, and particularly those sleep disorders that involve dissociated states of sleep and wakefulness. These characteristics are likely to lead to more reports of anomalous experiences, either because they enable the operation or recognition of anomalous processes or because they lead to the misinterpretation of normal experiences. Thus, boundary structure might be a useful variable to include in future models of the development of anomalous beliefs. However, it will not be included in this thesis because part of its aim is to test versions of Irwin's and Lawrence's models, both of which include an observed measure of fantasy proneness rather than a latent variable of which fantasy proneness is a component.

This notion of boundaries and differing degrees of permeability and transfer across them is remarkably similar to another new psychological construct, transliminality.

Transliminality

The concept of transliminality was first introduced by Thalbourne and Delin (1994). The term is derived from the Latin 'trans' meaning 'across' and 'limen' meaning 'theshold' and it is purported to measure:

> the extent to which the contents of some preconscious (or "unconscious" or "subliminal") region of the mind are able to cross the threshold into consciousness (or its sense of "awareness"). (p. 3).

This concept was 'discovered' during an investigation of the relationship between paranormal belief/experience and creativity, mystical experience and aspects of psychopathology (i.e., magical ideation and symptoms of mania and depression) in university students, manic-depressives and schizophrenics. Analysis of the data from the student sample revealed that these six variables were all significantly intercorrelated; most of these relationships were also apparent in the clinical samples (though the strength of the relationships with depression varied). A subsequent factor analysis identified a single factor that was tentatively labelled 'transliminality.' This factor was later replicated, although the depressive experience variable was dropped (Thalbourne, Bartemucci, Delin, Fox, & Nofi, 1997). Thalbourne et al. (1997) then conducted five further studies that attempted to look for correlates of this revised transliminality measure and concluded that schizotypy, fantasy proneness, absorption and hyperaesthesia (i.e., extreme sensitivity to external stimulation) are also core components of transliminality. Thalbourne and Houran (2000) also cited a study by Thalbourne (in press) whose factor analysis confirmed an expanded solution that included absorption, fantasy-proneness, hyperaesthesia, plus attitude towards dream interpretation. Interestingly, this latter study also included measures of dissociative experiences, which were not found to be core components. As a result of these subsequent findings, Thalbourne et al. (1997) also redefined transliminality as:

> Susceptibility to, and awareness of, large volumes of imagery, ideation and affect—these phenomena being generated by subliminal, supraliminal and/or external input. (p. 305).

A person who scores highly on transliminality would be someone who tends to be susceptible to the occurrence of large amounts of imagery, thought and emotion that may be largely involuntary (Thalbourne & Delin, 1994). Thalbourne and Delin (1994) also discovered that highly transliminal people tend to pay more attention to their inner processes and are more likely to attribute meaning to them. It is perhaps not surprising then to find that participants who reported precognitive or clairvoyance experiences, visions of deceased people or unusual healing powers had significantly higher transliminality scores than those who did not and that they tended to have stronger paranormal beliefs (Thalbourne & Delin, 1994). A more recent study of samples of the general population in Australia and the USA found that, in both countries, transliminality was positively correlated with paranormal experiences and beliefs, the sense of being high, daydreaming, the sense of mental potency, the tendency to introspect, and to experience altered consciousness (Thalbourne & Houran, 2000). Thus, a transliminal person is likely to be fantasy-prone, is likely to experience large amounts of imagery and emotion and can become easily absorbed in it. I would also predict that a transliminal person is more likely to experience hypnagogic/hypnopompic imagery, is more likely to pay attention to it and also to attribute meaning to it. Such an interest might also lead to reports of anomalous experiences and/or beliefs.

Thus, the available evidence suggests that people who have thin boundary or high transliminality personalities find it easy to enter and to become absorbed in ASCs, they experience a lot of imagery and dreams and may spend a lot of time fantasising and daydreaming, they pay a lot of attention to their internal state and often attempt to make sense of it, they can move fairly easily from one state of consciousness to another and may often experience mixed states of consciousness, which they can later recall. These characteristics may facilitate the operation or detection of anomalous processes, may encourage the misinterpretation of normal experiences, or the creation of imaginary anomalous experiences that are confused with reality. The theory behind boundary structure and transliminality would seem to predict that people who report higher fantasy proneness, more frequent dream experiences, HG/HP experiences and certain sleep disorders (e.g., nightmares) should be more likely to report anomalous experiences.

There is also some empirical evidence that imaginative ability and some of these hypnagogic/hypnopompic, sleep experiences and sleep disorder symptoms may be related to each other.

Relationships among fantasy proneness, hypnagogic/ hypnopompic experiences, dream experiences and sleep disorders

A number of studies have found links between measures of imaginative abilities and reports of sleep-related experiences. For example, people who score highly on measures of fantasy proneness (Myers & Austrin, 1985; Tonay, 1993), imaginal life (Martinetti, 1985) or on an imaginativeness dimension (upon which fantasy proneness loads strongly) (Spanos et al., 1995) also tend to report more frequent episodes of various sleep-related experiences, such as dream recall, night imagery, sleep paralysis, lucid dreaming, sleep talking, sleepwalking, nightmares and night terrors.

The frequencies of HG/HP experiences also seem to be related to each other and to reports of other sleep-related experiences. For example, the frequencies of hypnagogic and hypnopompic imagery are related to each other and also to false awakenings, lucid dreams and attention to subjective experience (Blackmore, 1983; Glicksohn, 1989, 1990; Spanos et al., 1995); hypnagogic imagery has also been found to be related to dream recall and dream control (Glicksohn, 1989, 1990), and the frequency of nightmares (Ohayon et al., 1996). There have also been a couple of reported cases of hypnagogic/hypnopompic-like imagery occurring during sleepwalking episodes (Kavey & Whyte, 1993). Finally, sleep paralysis sufferers have also been found to report higher incidences of false awakenings (Rose & Blackmore, 1996).

Previous research has also found that the frequencies of dream experiences, such as false awakenings, lucid dreams, dreams which one can control or create, and falling dreams, are all related to each other (Blackmore, 1983; Glicksohn, 1989; van Eeden, 1913).

In terms of arousal sleep disorders, episodes of confusional arousal have been reported by sufferers of sleep terrors and sleepwalking and vice versa (ASDA, 1990). Previous studies have also found relationships between sleepwalking and sleep talking (Fisher & Wilson, 1987; Spanos et al., 1995) and among sleepwalking, sleep terrors and nightmares (Spanos et al., 1995; Thorpy & Glovinsky, 1987). The sleep-wake transition sleep disorder, sleep talking, may also be precipitated by other sleep disorders, such as sleep terrors, confusional arousals and REM sleep behaviour disorder (ASDA, 1990). Further evidence for a relationship among sleep disorders comes from the Spanos et al. (1995) survey that found that nightmare/night terror, sleep talking/sleepwalking, night imagery (dream recall, vividness, HG/HP imagery) dimensions and a measure of lucid dreaming were all significantly intercorrelated with each other but not with the frequency of sleep paralysis. However, the intensity of sleep paralysis was significantly correlated with the night terror/nightmare and sleep talking/sleepwalking dimensions. Childhood frequencies of nightmares, night terrors, and to a lesser extent lucid dreams, have also been found to load on the same factor (Hunt et al., 1992).

Thus, there is evidence to suggest that a variety of HG/HP, dream and sleep disorder experiences are related to each other and also to measures of imaginative abilities and fantasy proneness. These relationships also suggest that more general factors may exist.

Models to be tested as part of this thesis

This chapter has attempted to establish that there is a need to test a number of competing models in order to determine the nature of the relationship between measures of anomalous experiences and beliefs, i.e., whether experience leads to belief, belief to experience or whether the relationship is reciprocal. There is also a need to determine whether there are both direct and indirect relationships between measures of fantasy proneness and anomalous beliefs.

Based partly upon the theories of boundary structure and transliminality and Wilson and Barber's finding that fantasy-prone people report much more HG/HP imagery, this chapter has also attempted to justify the addition of measures of the childhood frequencies of a number of HG/HP, dream and sleep disorder experiences to the aforementioned models. People who report these childhood experiences may find it easier to enter and become absorbed in altered states of consciousness and may also report vivid imagery. These characteristics may facilitate the operation or recognition of anomalous processes or they may facilitate the misinterpretation of normal experiences; both of these could lead to more frequent reports of anomalous experiences, regardless of whether or not they are genuine. In order to try to establish whether these characteristics only facilitate reports of anomalous experiences during childhood, when these sleep-related experiences are most prevalent, or whether they can continue to do so during adulthood, two measures of anomalous experiences will be included in the models to be tested.

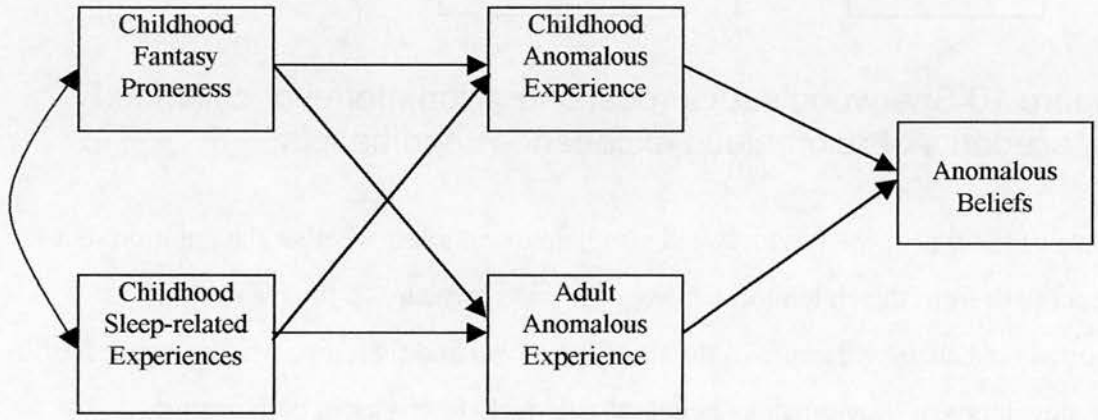


Figure 8 Sherwood's experiential source model of childhood antecedents of anomalous experiences and beliefs

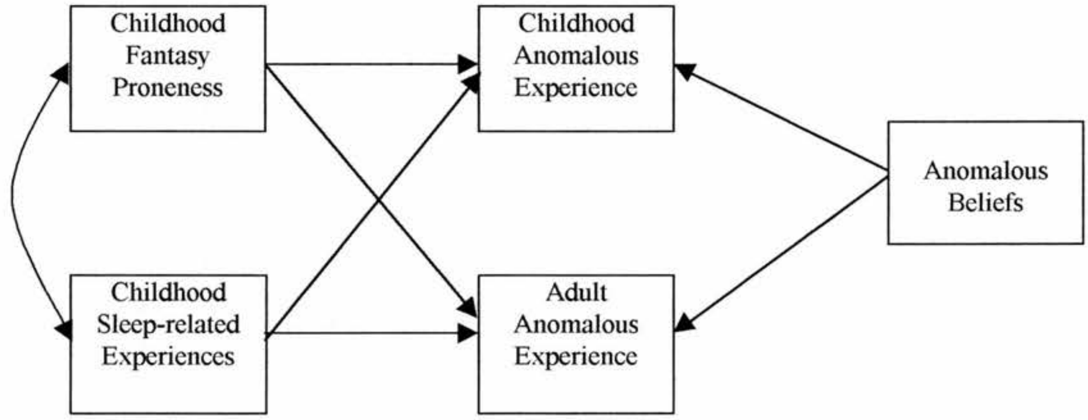


Figure 9 Sherwood's cognitive source model of childhood antecedents of anomalous experiences and beliefs

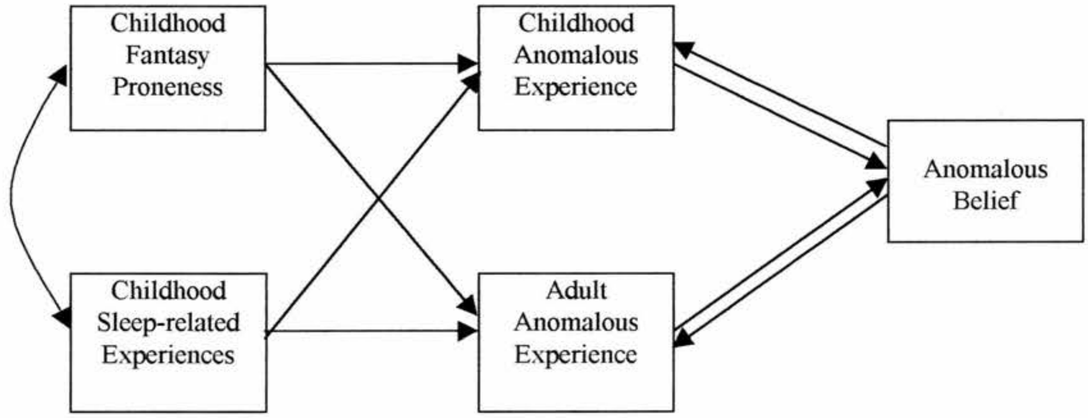


Figure 10 Sherwood's reciprocal causation model of childhood antecedents of anomalous experiences and beliefs

Tests of these proposed models will also help to establish whether the addition of a direct path from the childhood fantasy proneness measure to the measure of anomalous beliefs will improve the fit of the model and therefore whether models of the development of anomalous beliefs should include this extra path or not.

Data to test these models will be collected via cross-sectional surveys of adults, which will be conducted electronically via the world-wide web (WWW) and also via the more traditional pencil-and-paper method. More details concerning the rationale for these data collection methods will be provided in Chapter 6.

Chapter 4

Normal and anomalous experiences reported during the hypnagogic/hypnopompic and sleep states

The purpose of this chapter is to introduce the normal and anomalous experiences that are reported during the HG/HP and sleep states. In order to be able to make accurate and well-informed judgements regarding the nature of sleep-related experiences, it is necessary to have an understanding of the normal features; in order to classify an experience as involving anomalous processes, it is necessary to rule out known normal explanations first. This chapter will also consider why these states might be conducive to reports of genuine anomalous experiences and why they might also be conducive to misinterpretations of normal experiences.

Normal experiential features of the hypnagogic/hypnopompic states

Most research, both experimental and survey-based, seems to have focused on the hypnagogic state (i.e., the period between wakefulness and sleep) with comparatively little research having been carried out on the hypnopompic state (i.e., the period between sleep and wakefulness). The hypnagogic state, like the sleep state, is fairly complex and contains a number of steps and stages (Mavromatis, 1983; Rechtschaffen, 1994; Tanaka, Hayashi, & Hori, 1996, 1997). Although the hypnagogic state has unique behavioural, electrophysiological and subjective characteristics (Hori, Hayashi, & Morikawa, 1994), it is also highly variable and there are large individual differences (Rechtschaffen, 1994).

As a person relaxes or becomes drowsy, there is an increase in alpha activity (8-12 Hz) and eye movements become slower and less frequent (Parker, 1975; Rechtschaffen, 1994). As a person passes through the hypnagogic period into the early stages of NREM sleep, there is a decline in alpha activity (8-13 Hz) and a concomitant increase in slower theta activity (4-7 Hz) (Baddia et al., 1994; Bray, Cragg, Macknight, Mills, & Taylor, 1992; Rechtschaffen, 1994). During the transition from wakefulness to sleep there is also a decrease in muscle tone, a slowing of the heart and respiration rates, a reduction in blood pressure, and an increase in skin temperature (Mavromatis, 1983; Mavromatis & Richardson, 1984; Schacter, 1976). Upon awakening, these changes go in the opposite direction (Mavromatis, 1983).

The two main experiential features of the HG/HP states are HG/HP imagery and sleep paralysis.[4] Allied to the HG/HP states are a number of other specific experiences: for example, exploding head symptoms, a sense of presence, falling sensations, sleep starts and the HG/HP speech phenomenon.

This chapter will place more emphasis on the HG/HP phenomena than sleep phenomena for a number of reasons: based upon my knowledge of the literature and contact with a number of individuals puzzled by their own experiences, it seems to me that (1) people are less familiar and know less about normal HG/HP experiences, (2) generally-speaking, anomalous experiences of one sort or another are reported more frequently during the HG/HP states than during sleep, and (3) the characteristics of the HG/HP states are more likely to be misinterpreted than those of the sleep states.

Hypnagogic/hypnopompic imagery

Definition

The term 'hypnagogic imagery' was provided by Maury (1848) and was defined in Warren's Dictionary of Psychology (1934) as:

> Imagery of any sense modality, frequently of almost hallucinatory character, which is experienced in the drowsy state preceding deep sleep.

The term 'hypnopompic imagery' was introduced by F. W. H. Myers (1904) who defined it as:

---

[4] It is important to note that although hypnagogic/hypnopompic imagery and sleep paralysis may occur as auxiliary features of the narcolepsy sleep disorder, they can also occur independently in 'healthy' individuals (ASDA, 1990).

> pictures consisting generally in the persistence of some dream-image into the first moments of waking. (p.125).

Some writers distinguish between imagery which occurs in the hypnagogic and hypnopompic states (e.g., Glicksohn, 1989; McKellar, 1989) but others do not (e.g., Mavromatis, 1987; Mavromatis & Richardson, 1984). It is fair to say that they are similar and so many features will apply to both. However, certain features or experiences seem to be more common in the hypnagogic than in the hypnopompic state, and vice versa (e.g., Noyes, 1998). For this reason, I think it is useful to maintain the distinction.

It is not easy to distinguish hypnagogic and hypnopompic imagery from dream imagery. Any qualitative distinctions made will depend on the defining characteristics of HG/HP imagery and dreams (Mavromatis & Richardson, 1984), both of which would benefit from stricter definitions. However, there is some evidence that hypnagogic (and also hypnopompic) imagery tend to be more vivid and realistic, shorter, more passive, have less emotion, and also tend to be more disorganised and irrelevant (Foulkes & Vogel, 1965; McKellar, 1989; McKellar & Simpson, 1954; Mavromatis & Richardson, 1984). McKellar (1989) describes how:

> To use an analogy, dreaming resembles a lecture illustrated by slides which form part of it; hypnagogic imagery is more like a display of slides meant to illustrate some other lecture. Moreover, the slides have been mixed up, and follow one another in random. (p.103).

With hypnagogic experiences, there also seems to be a greater awareness of the true situation and more reality testing compared with dream experiences (Mavromatis & Richardson, 1984). It has also been suggested that, unlike dreams, hypnagogic imagery is something that is watched rather than taken part in (McKellar, 1989; McKellar & Simpson, 1954; Schachter, 1976). Some people also claim to be able to generate and/or control their HG/HP imagery to some extent (Mavromatis, 1987, p. 71).

Timing

It seems that episodes of HG/HP imagery often occur fairly sporadically although concentrated series of episodes can also occur (Mavromatis, 1987). Hypnagogic and hypnopompic images are typically very brief and dynamic and may last no more than a second or two (Nielsen, 1992).

Frequency

Generally speaking, hypnagogic imagery seems to be more common than hypnopompic imagery. Early surveys (e.g. Galton, 1883; Müller, 1848 cited by Mavromatis, 1987) estimated that about 2% of adults had experienced hypnagogic imagery of some form. More recent surveys have estimated that c. one-third (Leaning, 1925), 61-63% (McKellar & Simpson, 1954; McKellar, 1957) or c.75% (Glicksohn, 1989; Richardson et al., 1981) of people have experienced it on at least one occasion compared with 21.4% (McKellar, 1957) to 67.6% for hypnopompic imagery (Richardson et al., 1981). One recent survey estimated that 37% (12.5%) of the UK population had experienced some form of hypnagogic (hypnopompic) imagery at least twice a week during the preceding year (Ohayon et al., 1996). These different estimates may reflect the different survey techniques and different terminology used in these studies.

Hypnagogic imagery seems to be more frequent in children (Leaning, 1925; Schacter, 1976) and less frequent in older adults (Ohayon et al., 1996; Richardson et al., 1981). The incidence of hypnopompic imagery also seems to decrease with age (Ohayon et al., 1996; Richardson et al., 1981).

Hypnagogic and hypnopompic imagery seem to be more common in people who suffer from sleep problems, such as insomnia or nightmares, or who suffer from depression or anxiety disorders (Ohayon et al., 1996).

Sensory modalities

Although visual and auditory seem to be the most common forms of both hypnagogic and hypnopompic imagery (Foulkes & Vogel, 1965; Hori et al., 1994; McKellar & Simpson, 1954), olfactory (smell), gustatory (taste), tactile, thermal, bodily, movement, and synesthetic sensations (where imagery in one modality triggers modality in a different modality) may also occur (e.g., Leaning, 1925; Mavromatis, 1987; Schacter, 1976). However, researchers and writers have tended to say very little about the content of experiences that occur in modalities other than visual and auditory.

Visual

Studies have shown that as one moves through the sleep-onset period, the amount of visual hypnagogic imagery tends to increase (Hori et al., 1994), it becomes more dream-like (Foulkes & Vogel, 1965; Stickgold & Hobson, 1994) and the image quality, vividness, luminosity and intensity of colour also increase (Mavromatis, 1987; Nielsen, 1992).

Visual imagery typically occurs with the eyes closed though it can occur with eyes open (Gurney et al., 1886; Leaning, 1925; McKellar, 1989; McKellar & Simpson, 1954). It often begins with reports of clouds or mists of bright colours or a circle of light. Images may quickly change from one to another and may develop into progressively more complex images or mini-plays (Gurney et al., 1886; Leaning, 1925; McKellar, 1989; Mavromatis, 1987; Parco Zuliani, 1986). Scenes involving people are characterised by life and movement (Leaning, 1925) and have been likened to film trailers since they often seem to have no beginning or ending (Leaning, 1925; Mavromatis, 1987).

Occasionally the images may be in black and white rather than in colour (McKellar, 1957; McKellar & Simpson, 1954). Sometimes these visual images can contain more detail than is usually observed when looking at things during more usual circumstances (Leaning, 1925). The images may sometimes be very small (micropsias) or gigantic (megalopsias), though changes in size and shape are possible (Leaning, 1925; McKellar, 1957; McKellar & Simpson, 1954; Mavromatis, 1987). A series of continuous repetitions (polyopsias) of the same image may also be experienced. Sometimes the images appear to be strangely illuminated or may be seen from a peculiar angle (Leaning, 1925; Mavromatis, 1987; McKellar, 1957).

Visual HG/HP imagery is often pleasant, even humorous, but it can also be terrifying (McKellar & Simpson, 1954; Mavromatis, 1987). Although hypnagogic and hypnopompic imagery are characterised by variety, Mavromatis (1987) has modified Leaning's (1925) classification scheme and identified six recurrent themes:

(1) Formless, e.g. waves, clouds of colour,
(2) Designs, e.g. geometric and symmetrical patterns and shapes,
(3) Faces, figures, animals, objects,
(4) Nature scenes, e.g. landscapes, seascapes, gardens,
(5) Scenes with people,
(6) Print and writing, e.g. in real or imaginary languages.

It should perhaps be pointed out though that, although some regularities do occur, both hypnagogic and hypnopompic imagery are characterised by variety both within and outwith these categories (Leaning, 1925; Mavromatis, 1987).

Auditory

Mavromatis (1987) provided a summary of auditory HG/HP phenomena:

> Auditory hypnagogic [and also hypnopompic] phenomena include the hearing of crashing noises, one's name being called, a doorbell ringing, neologisms [new words or expressions], irrelevant sentences containing unrecognizable names, pompous nonsense, quotations, references to spoken conversations, remarks directed to oneself, meaningful responses to one's thought of the moment. (p.81).

Other reported imagery includes music, bangs and explosions. Sometimes auditory hypnopompic imagery can take the form of a warning of impending danger or an important event; other times it may just be a feeling of foreboding (Mavromatis, 1987). A related experience is the HG/HP speech phenomenon that occurs when a person hears him/herself uttering words, which can be nonsensical or irrelevant (McKellar, 1989; Mavromatis, 1987).

One hypnagogic experience, which involves both visual and auditory imagery, has become known as 'the exploding head syndrome'. The exploding head syndrome was probably first described by Mitchell (1890) and later by Armstrong-Jones (1920). The exploding head syndrome is:

> characterised by a sense of explosion in the head, confined to the hours of sleep, which is harmless but very frightening for the sufferer. (Pearce, 1989, p.907).

Sometimes there is a musical 'twang' rather than an explosion and the sounds can also be accompanied by a flash of light (Mitchell, 1890; Oswald, 1988). Reported symptoms may also include a sense of fear, heart palpitations and sweating, a strange sensation moving up the body (often from the feet or chest up to the head), a sensation as if breathing has stopped, and in one case a sense of falling was also reported (Mitchell, 1890; Pearce, 1989). Occasionally the shock may be preceded by a humming or buzzing sensation in the head (Mitchell, 1890).

This syndrome mainly occurs in the hypnagogic state, although some individuals report that it awakens them from their sleep (Mitchell, 1890; Pearce, 1989). Pearce (1989) suggests that "As a symptom it is probably fairly common…But, as a source of complaint it is rare…" (p.909). Whilst the syndrome can occur for the first time anywhere between childhood and old age, the most frequent onset (at least for chronic complaints) seems to be after the age of 51 (Pearce, 1989).

Olfactory, gustatory, tactile and bodily sensations

Sensations of smell (e.g., cigars, roses), taste (e.g., sweet), sensations of actively touching or being passively touched by someone or something, and hot or cold sensations, sometimes moving along the body, have also been reported during the hypnagogic and hypnopompic states (Mavromatis, 1987). Bodily sensations may also include, for example, a feeling of energy flowing through the body, weightlessness, heaviness, tingling, numbness, shaking/vibrating, or elongation of the body.

Sensations of movement

A sensation of falling seems to be the most commonly reported sensation of movement and is considered to be a characteristic hypnagogic phenomenon (Mavromatis, 1984; Schacter, 1976). The experience seems to be relatively common; McKellar (1957) and McKellar and Simpson (1954) found that 79-80% of their student samples reported the experience. The falling experience also often involves more than one sensory modality; it is often associated with a bodily jerk and visual imagery, such as falling off a cliff (Oswald, 1959; Mavromatis, 1987). In a recent survey, 25.3% of the sample reported that they had 'the feeling that you will soon fall into an abyss' at least twice a week (Ohayon et al., 1996).

Sleep starts

These bodily jerks, also known as 'sleep starts', may involve the whole or just part of the body and can be frightening experiences (ASDA, 1990; Mitchell, 1890; Oswald, 1959). According to the International Classification of Sleep Disorders (ICSD) (ASDA, 1990):

> ***Sleep starts** are sudden, brief contractions of the legs, sometimes also involving the arms and head, which occur at sleep onset.* (p.155).

The legs are affected more frequently than the arms though both the right and left limbs are usually affected together (Parkes, 1986).

The jerks can have a variety of accompanying sensations: e.g. visual imagery such as horrid faces or a flash of light, something passing or flowing through the body, a feeling of heat flowing down the legs, a feeling of swelling, or a sharp cry (ASDA, 1990; Oswald, 1959). In a self-observational study of his own hypnagogic imagery, Nielsen (1992) found that phasic (i.e., occasional) neuromuscular events

(NMEs) occurred in just over half of the hypnagogic images which involved illusory movement. Head nods were most frequent followed by leg, arm or whole body jerks.

The prevalence of sleep starts is about 60-80% of the population with no apparent sex differences (ASDA, 1990; Oswald, 1959, 1962; Mavromatis, 1987). Sleep starts can occur at any age (ASDA, 1990); they can occur en masse for a period of time and then disappear only to reappear at a later date (Mavromatis, 1987).

It is not clear what causes sleep starts. It has been suggested that they may be the result of an intrusion of a REM sleep event into wakefulness of early NREM sleep (Mahowald & Thorpy, 1995).

A sense of presence

A sense of presence is sometimes reported during the hypnagogic and hypnopompic periods (Ohayon et al., 1996) and may coincide with both imagery and sleep paralysis in both normal subjects and narcoleptics (Blackmore, 1996; Conesa, 1995; Hufford, 1982; Moorcroft, 1993; Rose & Blackmore, 1996; Siegel, 1992; Spanos et al., 1993, 1995; Wing, Lee & Chen, 1994). Feelings of foreboding or being under threat, or more general feelings of confusion and disorientation, have also been reported.

Recent surveys have found that 56-68% of children and adults have experienced a sense of presence (Rose & Blackmore, 1996) and that 10% of males and 15% of females in a large UK sample reported this experience at least twice a week for a year (Ohayon et al., 1996).

Another hypnagogic or hypnopompic experience, which can sometimes be accompanied by imagery and/or a sense of presence, is a sleep disorder known as 'sleep paralysis.'

Sleep paralysis

Definition

According to the American Sleep Disorders Association (ASDA) (1990):

> ***Sleep paralysis*** *consists of an inability to perform voluntary movements either at sleep onset (hypnagogic or pre-dormital form) or upon awakening either during the night or in the morning (hypnopompic or post-dormital form).* (p.166).

Timing

The sleep paralysis episode usually lasts from a few seconds to a few minutes although a duration as long as 70 minutes has been reported (Goode, 1962; Schneck, 1960; Spanos et al., 1995). The experience is sometimes preceded by and/or accompanied by visual imagery which can be terrifying (Blackmore, 1996; Conesa, 1995; Goode, 1962; Penn et al., 1981; Spanos et al., 1995; Takeuchi et al., 1992). The experience may end due to efforts to overcome it by the experient, may be terminated by someone else either by touch or by verbal communication, the experience may move into a dream (possibly lucid) or the episode may simply terminate spontaneously (ASDA, 1990; Firestone, 1985; Goode, 1962; Schneck, 1960; Snyder, 1983). Sometimes a person may experience several episodes during the same night (Terrillon & Marques-Bonham, 1998).

Frequency

It seems that sleep paralysis can be classified as one of three or four types: narcoleptic, isolated, familial (ASDA, 1990) or as part of other sleep disturbances (Parkes, 1986). The familial form seems to be transmitted genetically (Bell, Dixie Bell & Thompson, 1986b; Dahlitz & Parkes, 1993).

The hypnagogic form of sleep paralysis seems to be more frequent than the hypnopompic form (Conesa, 1995; Goode, 1962; Spanos et al., 1995) although the opposite has also been reported (Penn et al., 1981). The International Classification of Sleep Disorders (ASDA, 1990) estimates that isolated sleep paralysis (i.e. that which occurs independently of narcolepsy) occurs at least once in a lifetime in 40-50% of normal people. Surveys have found that between 4.7% to 49% of people have reported sleep paralysis (of one or other or both forms) though the most frequent estimates range between 30-45% (Goode, 1962; Everett, 1962; Fukuda, Ogilvie, Chilcott, Venditelli, & Takeuchi, 1998; Penn et al., 1981; Spanos et al., 1995; Blackmore, 1996; Rose & Blackmore, 1996). However, a recent large scale survey of the general population in Germany and Italy suggested that only 6.2% of the sample had experienced at least one episode of sleep paralysis during their lifetime (Ohayon, Zulley, Guilleminault, & Smirne, 1999).

The variation of these frequency estimates may be partly be a function of the research method and the wording of the questions (Fukuda, 1993; Fukuda et al., 1998; Green & McCreery, 1994), different survey methods (Ohayon et al., 1999), factors which influence participants' willingness to report it and the salience of the experience (Spanos et al., 1995).

Sleep paralysis often occurs for the first time during adolescence or early adulthood (Fukuda, Miyasita, Inugami, & Ishihara, 1987; Goode, 1962; Penn et al., 1981; Spanos et al., 1995) athough onset during childhood, middle and later adulthood has also been reported (ASDA, 1990).

Features

Accompanying features of sleep paralysis may include: acute anxiety or terror, awareness of the surroundings, HG/HP imagery, a sense of presence, difficulty breathing or a sense of suffocation, pressure on the chest, a tendency to mentally or physically struggle to overcome it, a feeling of time distortion, and sometimes sexual arousal (Blackmore, 1996; Conesa, 1995, 1997; Fukuda et al., 1998; Goode, 1962; Hufford, 1982; Liddon, 1967; Penn et al., 1981; Rose et al., 1997; Schneck, 1960, 1977; Snyder, 1983; Spanos et al., 1995; Takeuchi et al., 1992; Terrillon & Marques-Bonham, 1998). The paralysis mainly affects the skeletal muscles although the respiratory muscles can be affected to some extent; eye muscles are not usually affected (Mahowald & Thorpy, 1995; Parkes, 1985). It is likely that minor paralysis of the respiratory muscles may account for the difficulty in breathing and suffocation sensations.

Summary of experiential features of hypnagogic/hypnopompic states

- Visual imagery
- Auditory imagery (including exploding head syndrome and hypnagogic/hypnopompic speech phenomenon)
- Olfactory, gustatory, tactile and bodily sensations
- Sensations of movement (including the falling experience)
- A sense of presence
- Sleep starts
- Sleep paralysis

Experiential features of the sleep state

During a typical night, an adult will pass through 4-5 cycles of sleep, with each one comprising of periods of both non-rapid-eye-movement (NREM) and rapid-eye-movement (REM) sleep; each cycle lasts about 90 minutes (Rechtschaffen, 1973).

The first part of the sleep cycle, the period of NREM sleep, can be divided into four separate stages (Rechtschaffen & Kales, 1968). During NREM sleep, heart and respiration rates decrease, there are virtually no eye movements, and there is an increase in muscular relaxation (Lavie, 1996, chap. 2). During NREM sleep, the brain is relatively inactive and the body is relaxed but able to move (Symons, 1993).

Having progressed through the hypnagogic state/Stage 1 sleep, an individual enters Stage 2 sleep at which point they are generally considered to be 'asleep' (Lavie, 1996; Rechtschaffen, 1994). Stage 2 sleep is characterised by theta activity (4-7 Hz) and the appearance of sleep spindles (short rhythmical bursts of 12-16 Hz) and the presence of K-complexes (occasional sharp changes in EEG amplitude)

(Lavie, 1996; Rechtschaffen, 1973). It is fairly easy to be awakened during Stages 1 and 2 sleep (Lavie, 1996).

During Stages 3 (20-50%) and 4 (50%+) the EEG trace is increasingly dominated by the presence of delta (1-3 Hz) EEG activity (Rechtschaffen, 1973). The sleeper is relatively unresponsive to external stimuli during Stages 3 and 4 and is therefore difficult to awaken, although personal stimuli, such as hearing a baby crying, may produce awakening (Empson, 1993; Lavie, 1996; Rechtschaffen, 1973).

The sleeper then reverses back through Stages 3 and 2 before entering a period of REM sleep (Rechtschaffen, 1973). Note that in the later sleep cycles, Stages 3 and 4 may be bypassed and the sleeper may alternate between REM and NREM Stage 2 (Rechtschaffen, 1973). With each sleep cycle the proportion of REM increases and the proportion of NREM decreases; REM periods can last from a few minutes to over 30 minutes (Guyton, 1991; Rechtschaffen, 1973). When we awaken in the morning, we tend to do so from a period of REM sleep (Guyton, 1991).

REM sleep is characterised by the appearance of phasic bursts of rapid jerky eye movements, reports of dreaming, a highly active brain similar to that in the waking state, and muscular paralysis (Rechtschaffen, 1973). However, the heart, diaphragm, eye muscles and smooth muscles are not paralysed. This explains why the eyes are not affected by the muscle paralysis (Lavie, 1996, p. 24). However, during REM sleep this paralysis is occasionally interrupted by phasic muscular twitches or movements of the body (Mavromatis, 1983; Oswald, 1970).

The EEG during REM sleep comprises a tonic background of low voltage nonsynchronised activity not unlike that of wakefulness; there is theta activity (without K-complexes or sleep spindles) plus short bursts of alpha activity which indicates a high level of alertness (Lavie, 1996). During REM sleep the brain activity is similar to that during NREM Stage 1 except that the sleep is deep and the sleeper is difficult to awaken (Lavie, 1996; Rechtschaffen, 1973).

Some features of sleep, such as dreams, are very common and usually do not disrupt the sleep-wake cycle or cause problems for the sleeper. Frequent body movements throughout the night are also normal and tend to accompany shifts in sleep stages (Parkes, 1985, p. 191). Other possible features of sleep, such as sleepwalking, may be less common and may be classified as 'sleep disorders' because they can cause problems for the sleeper in some instances.

The following sleep-related experiences included in this thesis were selected because they have been associated with reports of anomalous experiences: dream recall, flying and falling dreams, pre-lucid and lucid dreams, false awakenings and narcolepsy symptoms (which can include hypnagogic imagery and sleep paralysis). The following experiences were included because they are often frightening and could be interpreted as being anomalous and/or could lead to the development of anomalous beliefs: sleep terrors, nightmares, and the proposed sleep disorder[5], sleep choking syndrome. A number of other sleep disorders were also included because they were of a similar type of disorder to those above and because they would be relatively familiar to those who have experienced them: confusional arousal, sleepwalking, rhythmic movement disorder, sleep starts, sleep talking, nocturnal leg cramps, REM sleep behaviour disorder, sleep bruxism (teethgrinding), sleep enuresis (bedwetting) and primary snoring.

Dreaming

Some form of mentation seems to occur during sleep and this is generally referred to as 'dreaming'. Dreams are most frequently recalled following awakenings from REM sleep, although dream-like mentation is also recalled following awakenings from NREM sleep (Dement & Kleitman, 1957; Rechtschaffen, 1973). More recent studies have found that dreaming can occur during NREM Stages 2-4; the findings will depend to some extent on the dream definition used (Empson, 1993; Lavie, 1996; Pivik, 1991; Reinsel, Antrobus, & Wollman, 1992).

It has been suggested that REM dreams tend to be visually vivid and often have bizarre and illogical features whereas NREM dreams tend to be less visual, less vivid, less easily-recalled, less emotional, more pleasant, more plausible, more

[5] According to the International Classification of Sleep Disorders (American Sleep Disorders Association, 1990), proposed sleep disorders are "those disorders for which there is insufficient information available to confirm the unequivocal existence of the disorder...Most newly described sleep disorders fall under this category until replicated data are available in the literature, e.g., sleep choking syndrome." (p. 20).

concerned with what is happening in real life, and are more like normal thinking (Moorcroft, 1993; Pivik, 1991; Symons, 1993). However, some have argued that the REM-NREM mentation distinction is relative rather than absolute (see Symons, 1993).

As with HG/HP imagery, dreams can involve a variety of different sensory modalities, often simultaneously. However, again, the evidence suggests that visual and auditory tend to be the most common; sensations of movement and temperature are relatively infrequent and tactile, olfactory and gustatory sensations are rare (see Symons, 1993).

It has been argued that everyone dreams; it is just that there are large individual differences in the extent to which people are able to recall them when they awaken (Goodenough, 1991). To some extent, it will depend upon which stage of sleep we awaken from; we are more likely to report dreams if we awaken from REM sleep (e.g., Dement & Kleitman, 1957). Laboratory studies have shown that, on average, dreams are reported on about 80% of awakenings from REM sleep (see Goodenough, 1991).

Flying and falling dreams

Dreams in which the sleeper is actually flying or falling seem to be fairly common. Survey estimates for the incidence of flying dreams range from 28% (Blackmore, 1984) to between 50-65% (e.g., Blackmore, 1982b, 1983, 1986); estimates for falling dreams include 62% (Blackmore, 1983) and 85% (Blackmore, 1986). An early paper by Harriman (1939) suggested that, with falling dreams, "The dream seems to have a content peculiar to each individual…[and] [t]he content of the dream appears to be closely related to some waking experience." (pp. 230-231).

The incidence of flying and falling dreams has been found to be related to each other and also to false awakenings (Glicksohn, 1989). There is also evidence to suggest that the incidence of flying and falling dreams is related to the incidence of lucid dreams (Blackmore, 1982b, 1983), pre-lucid dreams and false awakenings (Barrett, 1991); in some instances it appears that a flying dream may be a precursor, or a feature, of pre-lucid or lucid dreams (van Eeden, 1913; Green, 1968).

Pre-lucid and lucid dreams

Occasionally, an unusual feature of a dream may cause the dreamer to begin to consider their status quo or they may simply begin to test whether or not they are awake or dreaming (Green & McCreery, 1994). As Green (1968, p. 23) points out:

> Before going on to consider lucid dreams proper, it is interesting to consider the type of dream in which the subject adopts a critical attitude towards what he is experiencing, even to the point of asking himself the question 'Am I dreaming?' but without realizing that he is in fact doing so. Such dreams will be called 'pre-lucid dreams'.

In some, but not all, cases a pre-lucid dream may end with a lucid dream (Green, 1968; Green & McCreery, 1994). In fact, there seems to be a close relationship between pre-lucid dreams, lucid dreams, and false awakenings (Green & McCreery, 1994).

During lucid dreams, a term introduced by van Eeden (1913), the dreamer becomes aware that he/she is dreaming; the dreamer may have a simultaneous awareness of their dream and reality; attempts to control or influence the dream may also be made with varying degrees of success. However, there is some disagreement over the definition of lucid dreaming and the extent to which the two latter features are necessary (Gackenbach, 1991). LaBerge and Gackenbach (2000) have recently estimated that most people will have at least one lucid dream during their lifetime. This is supported by survey estimates that range from 56% to 100% (e.g., Blackmore, 1982b, 1983, 1986; Glicksohn, 1989; Kohr, 1980; Palmer, 1979; Rose & Blackmore, 1996; Snyder & Gackenbach, 1988).

Lucid dreams may be extremely realistic; though they tend to be mainly visual, auditory and bodily sensations and sensations of smell and taste (though fairly rare) can also occur (Green, 1968, p. 23). Pain and physical damage seem to be rare in lucid dreams (Green, 1968).

Hearne (1978; see Hearne, 1990), LaBerge, Nagel, Dement, & Zarcone (1981) and Ogilvie, Hunt, Sawicki, & McGowan, (1978) were some of the first researchers to provide experimental evidence that lucid dreams tend to occur during REM sleep and that dreamers are able to signal that they are aware that they are dreaming (see also LaBerge, 1990; LaBerge & Gackenbach, 2000).

There appear to be a number of ways in which a lucid dream can be initiated from either the waking or the dream state (see Green, 1968, pp. 30-44; LaBerge, 1990, p. 115). A person may sometimes be able to enter a lucid dream by monitoring their mental processes as they are falling sleep. Alternatively, a person may awaken briefly from a dream but then fall asleep again and immediately enter a dream but with little or no loss of conscious awareness (LaBerge, 1990). Non-lucid dreams may also become lucid as a result of emotional stress within the dreams (e.g., recurrent nightmare), a recognition of incongruity or the dreamlike quality of the dream, or as a result of analytical or critical thought (Green, 1968).

Dream control

Although lucid dreamers sometimes have some degree of control over the contents of their dreams, this control is often fairly limited and unreliable and control attempts may result in a loss of lucidity or awakening (Green, 1968). A survey by Blackmore (1983) found that 59% of the respondents had been able to stop a dream and 44% had been able to control or create a dream. Unpleasant lucid dreams or nightmares are episodes where dream control can sometimes be used to terminate a dream and awaken the dreamer (Green, 1968, pp. 45-50). People who have a recurrent dream which is unpleasant may learn to recognise it as a being a dream which may then enable them to exert some degree of control over it.

False awakenings

Van Eeden (1913, p. 456) was probably one of the first writers to describe false awakenings, dreams which he referred to as "wrong waking up." Recent surveys by Rose and Blackmore (1996) found that 83% of adults and 57% of children (aged 8-13) had experienced a false awakening; a second survey with a sample aged 8-79 years found that the estimate was 74%. During a (Type 1) false awakening a person basically tends to dream that they have woken up but it is only later, when they actually wake up, that they realise that they were dreaming. False awakenings tend to resemble lucid dreams in many ways apart from the awareness of being in a dream (Green & McCreery, 1994).

Green (1968) distinguishes between Type 1 and Type 2 false awakenings. Type 2 false awakenings are less common and the dreamer tends to 'wake up' to a tense stormy atmosphere or else he/she may begin to feel that there is something wrong or that something is about to happen. Ominous noises and/or strange figures may sometimes be seen too (Green & McCreery, 1994). Paralysis is sometimes associated with (Type 2) false awakenings too (Rose & Blackmore, 1996; Green & McCreery, 1994). One notable difference between Type 1 and Type 2 experiences is that during Type 2 the individual tends to remain in bed in the dream scenario whereas during Type 1 experiences the individual tends to get up out of bed and move about (Green, 1968, p. 124). False awakenings may be very convincing; the dreamer may examine his/her dream environment in great detail without concluding that it is any different from waking reality (Green, 1968, p. 73).

Sleep disorders

According to the American Sleep Disorders Association (ASDA) (1990), there are two main categories of sleep disorders: dyssomnias and parasomnias. Dyssomnias are sleep disorders which produce either a difficulty in initiating or maintaining sleep or excessive sleepiness (e.g. insomnia, narcolepsy); parasomnias are disorders that intrude into the sleep process.

Symptoms of narcolepsy (excessive sleepiness, cataplexy, hypnagogic/ hypnopompic, sleep paralysis) were considered as part of this thesis, as were parasomnias from five different subcategories: arousal disorders (e.g., sleepwalking), sleep-wake transition disorders (e.g., sleep starts), parasomnias usually associated with REM sleep (e.g., nightmares), other (e.g., snoring), and proposed parasomnias (sleep choking).

Dyssomnias

Narcolepsy

According to the International Classification of Sleep Disorders (ASDA, 1990):

> ***Narcolepsy*** *is a disorder of unknown etiology, which is characterized by excessive sleepiness that is typically associated with cataplexy and other REM sleep phenomena such as sleep paralysis and hypnagogic hallucinations.* (p.38).

Cataplexy and/or excessive sleep attacks are the main diagnostic criteria for narcolepsy, although hypnagogic imagery and sleep paralysis are defined as auxiliary symptoms which make up the narcolepsy tetrad (ASDA, 1990). Cataplexy is a unique feature and involves a sudden loss of muscle tone that tends to follow strong emotion, such as anger or surprise. The cataplexy may affect certain areas or all of the skeletal muscles. Excessive sleepiness may result in sudden sleep attacks during which the sufferer falls asleep, often in the middle of normal activities (ASDA, 1990).

Narcolepsy is quite rare and is estimated to affect only 0.03-0.16% of the general population (ASDA, 1990). Narcolepsy often begins during adolescence or early adulthood.

Parasomnias

Parasomnias occur more often in children than in adults (Parkes, 1985). The most common parasomnias in children are arousal disorders (Mahowald & Thorpy, 1995).

a) Arousal disorders (confusional arousals, sleepwalking, sleep terrors)

Confusional arousals

> ***Confusional arousals*** *consist of confusion during and following arousals from sleep, most typically from deep sleep in the first part of the night.* (ASDA, 1990, p.142).

During confusional arousals the eyes may be open or closed (Rosen et al., 1995) and the individual may be disoriented in terms of the time and/or where they are (ASDA, 1990). The individual may also demonstrate inappropriate behaviour such as picking up a lamp when s/he believed that the telephone had rung (ASDA, 1990). Memory for events surrounding episodes may be impaired.

Confusional arousals are almost universal before the age of 5 years (ASDA, 1990) and the incidence tends to peak during the toddler/pre-school years (Rosen et al., 1995). The incidence of confusional arousals tends to decrease with age and is relatively rare in adulthood (ASDA, 1990).

Sleepwalking

> ***Sleepwalking*** *consists of a series of complex behaviors that are initiated during slow wave sleep and result in walking during sleep.* (ASDA, 1990, p.145).

Sleepwalking can involve a range of different behaviours such as sitting up or walking around the room (ASDA, 1990). Sleepwalking may be a bit of a misnomer as most children sit up in bed, perhaps making repetitive, purposeless movements, rather than actually walking (Parkes, 1985).

Sleepwalking episodes do not usually last for more than 10 minutes, and rarely as long as an hour (Murray, 1991; Parkes, 1985; Rosen et al., 1995). Episodes may end spontaneously or the sleeper may return to bed and resume their sleep. The sufferer may be difficult to awaken during an episode and may be confused upon awakening (ASDA, 1990; Parkes, 1985). There is usually no memory of the sleepwalking either when they awaken or the following day (ASDA, 1990; Horne, 1992; Murray, 1991; Parkes, 1985) though there may be some awareness of having had a poor night's sleep (Parkes, 1985).

It is estimated that 1-15% of the general population have experienced sleepwalking which tends to peak between the ages of 4-8 years or pre-adolescence (ASDA, 1990; Rosen et al., 1995). Sleepwalking episodes tend to disappear after adolescence (ASDA, 1990).

Sleep terrors

> ***Sleep terrors*** *are characterized by a sudden arousal from slow wave sleep with a piercing scream or cry, accompanied by autonomic and behavioral manifestations of intense fear.* (ASDA, 1990, p.148).

The sufferer may also sit up in bed and exhibit automatic behaviour and be unresponsive to external stimuli. If they awaken, they may be confused and disoriented and may take a while to recover (ASDA, 1990; Horne, 1992; Parkes, 1985). The sufferer may also have widely-dilated pupils, and experience tachycardia and sweating (Parkes, 1985; Rosen et al., 1995). People do not tend to remember the episodes, although they may recall brief fragments of dreamlike mentation (ASDA, 1985; Horne, 1992; Parkes, 1985).

It is estimated that sleep terrors are reported by 3% of children and less than 1% of adults (ASDA, 1990); episodes are typically experienced between the ages of 4-12 and peak during adolescence after which they tend to decline spontaneously (ASDA, 1990; Rosen et al., 1995).

b) Sleep-wake transition disorders (e.g., rhythmic movement disorder, sleep starts, sleep talking, nocturnal leg cramps)

Rhythmic movement disorder

> ***Rhythmic movement disorder*** *comprises a group of stereotyped, repetitive movements involving large muscles, usually of the head and neck, which typically occur immediately prior to sleep onset and are sustained into light sleep.* (ASDA, 1990, p.152).

Rhythmic movement disorder is most common in infants and toddlers and rarely persists beyond the age of 4 years, though it can persist into adolescence and adulthood (Mahowald & Thorpy, 1995). Episodes tend to last for less than 15 minutes but may last up to several hours (Mahowald & Thorpy, 1995).

Sleep talking

> ***Sleep talking** is the utterance of speech or sounds during sleep without simultaneous subjective detailed awareness of the event.* (ASDA, 1990, p.157).

The content is usually highly variable, brief and lacking in emotional stress, although most speeches contain a few words or single words (Arkin, 1991; ASDA, 1990). Sleep speeches tend to only last for a few seconds but a duration of over a minute is possible (Arkin, 1991). Sleep talking is very common, perhaps more so than is realised because sleep talkers themselves tend not to remember the events (Arkin, 1991; ASDA, 1990).

Nocturnal leg cramps

> ***Nocturnal leg cramps** are painful sensations of muscular tightness or tension, usually in the calf, but occasionally in the foot that occur during the sleep episode.* (ASDA, 1990, p.159).

These cramps may arouse or awaken the sleeper but may only last for a few seconds. More than one episode of nocturnal leg cramps can be experienced in a given night (ASDA, 1990). No definitive data exists regarding the incidence of nocturnal leg cramps or the relative sex ratio but it seems to be more prevalent among the elderly (ASDA, 1990).

c) Parasomnias usually associated with REM sleep (e.g., nightmares, sleep paralysis, REM sleep behaviour disorder)

Nightmares

> ***Nightmares** are frightening dreams that usually awaken the sleeper from REM sleep.* (ASDA, 1990, p.163).

The recall of dream mentation and the fright or anxiety are key aspects to the nightmare (ASDA, 1990). It is estimated that approximately 75% of people will recall one or more nightmares during their childhood (ASDA, 1990).

Of particular interest is the finding that those who are frequent nightmare sufferers often report a difficult childhood and may have had relationship difficulties during adolescence and early adulthood; they may also be particularly open personalities and may be quite artistic or creative (ASDA, 1990). These are both factors that have been associated with fantasy proneness (Wilson & Barber, 1983). Stress and trauma are also known to increase nightmare frequency and severity (ASDA, 1990).

Nightmares should be differentiated from sleep terrors; nightmares are associated with recall of dream mentation, occur during REM sleep and are not associated with such a marked increase in heart and respiration rates (ASDA, 1990; Parkes, 1985). In addition, nightmares are usually followed by full alertness (Parkes, 1985).

REM sleep behaviour disorder

> ***REM sleep behavior disorder*** *is characterized by the intermittent loss of REM sleep electromyographic (EMG) atonia and by the appearance of elaborate motor activity associated with dream mentation.* (ASDA, 1990, p.177).

During normal REM sleep skeletal muscles are paralysed but this is not always the case for sufferers of REM sleep behaviour disorder and they may punch, kick, jump up or run away in response to their dream mentation (ASDA, 1990). Although REM sleep disorder usually begins in late adulthood (ASDA, 1990), it has been reported in children (Mahowald & Thorpy, 1995). It is quite rare and many apparent cases are probably more accurately diagnosed as other types of parasomnia (ASDA, 1990).

d) Other parasomnias (e.g., sleep bruxism, sleep enuresis, primary snoring)

Sleep bruxism

> ***Sleep bruxism** is a stereotyped movement disorder characterized by grinding or clenching of the teeth during sleep.* (ASDA, 1990, p.182).

It is estimated that 85-90% of the population will suffer from sleep bruxism at some point in their lifetimes (ASDA, 1990); it usually occurs between age 2-15 or 10-20 years or in the elderly (ASDA, 1990; Parkes, 1985). Estimates of the prevalence in children vary widely from 7-88% (Mahowald & Thorpy, 1995).

Sleep enuresis

> ***Sleep enuresis** is characterized by recurrent involuntary micturition that occurs during sleep.* (ASDA, 1990, p.185).

Sleep enuresis, or bedwetting, is common in children below the age of 5 years but is considered to be problematic if it occurs beyond this age (ASDA, 1990). Children may sometimes report dreams in association with the bedwetting, such as being in the bathroom (ASDA, 1990). It is estimated that up to 15% of children will suffer from sleep enuresis (Parkes, 1985).

Primary snoring

> ***Primary snoring** is characterized by loud upper airway breathing sounds in sleep, without episodes of apnea or hypoventilation.* (ASDA, 1990, p.195).

Snoring tends to be continuous and appear with each breath. It may occur at any age but is particularly prevalent during middle age (ASDA, 1990).

Proposed sleep disorder

Sleep choking syndrome

> ***Sleep choking syndrome*** *is a disorder of unknown etiology characterized by frequent episodes of awakening with a choking sensation.* (ASDA, 1990, p.307).

Sleep choking is a proposed sleep disorder which is characterised by a sudden awakening from sleep accompanied by a choking sensation and a feeling of being unable to breathe (ASDA, 1990). The sleeper becomes fully awake and may be very frightened and concerned that they are going to die (ASDA, 1990). It seems to be most common (the incidence is unknown) in early to middle adulthood but is not believed to occur during childhood (ASDA, 1990). However, this experience was still included because of its frightening nature and because of limited clinical knowledge of its occurrence and features.

Summary of selected experiential features of the sleep state and related sleep disorders

Normal dream-related

- Normal dreaming
- Flying and falling dreams
- Pre-lucid and lucid dreams
- Dream control
- False awakenings

Dyssomnias

- Narcolepsy (excessive sleepiness, cataplexy, hypnagogic/ hypnopompic, sleep paralysis)

Parasomnias

- Arousal disorders (e.g., confusional arousals, sleepwalking, sleep terrors)
- Sleep-wake transition disorders (e.g., rhythmic movement disorder, sleep starts, sleep talking, nocturnal leg cramps)
- Parasomnias usually associated with REM sleep (e.g., nightmares, sleep paralysis, REM sleep behaviour disorder)
- Other parasomnias (e.g., sleep bruxism, sleep enuresis, primary snoring)

- Proposed sleep disorder (sleep choking syndrome)

What kinds of anomalous experiences and beliefs have been associated with the hypnagogic/hypnopompic and sleep states?

Certainly, there is evidence that some people may attach a paranormal or supernatural interpretation to sleep-related experiences (e.g., Blackmore, 1996; Hufford, 1982; Leaning, 1925; Liddon, 1967; McKellar, 1957, 1989; Ness, 1978; Nielsen, 1991; Spanos et al., 1993; Wing et al., 1994) and, in some cases, they may hold such beliefs even though they have not had such experiences themselves.

Much of the evidence suggesting that the naturally-occurring HG/HP and sleep states are conducive to reports of anomalous experiences comes from surveys and spontaneous case collections. Unfortunately, few surveys and case collections have attempted to establish whether or not the reports of anomalous experiences are genuine by seeking corroborative evidence. One notable exception is the case collection reported in 'Phantasms of the Living' (Gurney et al., 1886). The investigators did attempt to corroborate the reports they received and they only selected cases that they felt were particularly strong. Nevertheless, it is generally quite difficult to establish the veracity of spontaneous reports and cases collected as part of surveys because of the subjective nature of such accounts, the dependence on memory, the unreliability of human testimony, possible deception and fraud, and the difficulties in obtaining corroborating evidence (Irwin, 1999; Rhine, 1977; Rush, 1986b). A better way of trying to establish evidence for anomalous processes or agencies is to try to induce and/or study them under controlled conditions, such as in a laboratory. However, this is not always possible, or ethical, for some anomalous experiences, such as alien abduction experiences and NDEs. Nevertheless, attempts have been made to study ESP, OBEs and apparition experiences in conditions that resemble the HG/HP and/or sleep states and an evaluation of this evidence will constitute the major part of Chapter 5.

The hypnagogic/hypnopompic states

The literature suggests that a variety of anomalous experiences have been reported during the HG/HP states, including ESP (e.g., Gurney et al., 1886), PK (Rose et al., 1997), apparitions of the living and the dead (e.g., Campbell, 1992; Green & McCreery, 1989; Gurney et al., 1886; Moody with Perry, 1993), past life experiences (e.g., Leaning, 1925; Rose et al., 1997), OBEs (e.g., Palmer, 1978b; Sheils, 1978), NDEs (Rose et al., 1997), and extra-terrestrial experiences (e.g., Mack, 1994; Spanos et al., 1993).

There is also some evidence to suggest that people who report more normal HG/HP experiences also tend to report more anomalous experiences. For example, McCreery (1993) found a positive relationship between the number of reported hypnagogic imagery episodes and the number of reported OBEs; Glicksohn (1989) found a small positive correlation between OBEs and hypnopompic but not hypnagogic imagery. Turning to sleep paralysis, McClenon (1994a) found a significant positive correlation between the frequency of sleep paralysis and a psi index in five different cross-cultural student samples. Rose and Blackmore (1996) also found that adults who reported OBEs tended to report sleep paralysis. Wilson and Barber's (1983) fantasy prone participants also reported a higher frequency of HG/HP imagery as well as a range of anomalous experiences including ESP, OBEs/NDEs, encounters with spirits and apparitions, the perceived ability to heal and religious visions.

If HG/HP imagery and sleep paralysis do not directly cause or facilitate anomalous experiences (and we cannot draw any causal conclusions from correlational data alone), it may be that the capacity that allows these HG/HP experiences also allows anomalous experiences to occur.

The sleep state

A variety of anomalous experiences have also been reported during the sleep state, including ESP (e.g., Gurney et al., 1886; Rhine, 1981), past life memories (e.g., Mills, 1994), communication with the dead (e.g., Green, 1968; Green & McCreery, 1994; Gurney et al., 1886; Van Eeden, 1913), OBEs (e.g., Irwin, 1985b; Salley, 1982; Sheils, 1978), and extra-terrestrial experiences (e.g., Mack, 1994; Spanos et al., 1993).

Again, there is evidence that people who report more normal sleep-related experiences, such as various types of dreams and some sleep disorders, also tend to report more anomalous experiences. For example, Alvarado (1998b) found that sleepwalkers scored higher on a measure of parapsychological experiences (ESP, apparition, OBE and seeing auras items); Spanos et al. (1995) found significant positive correlations between sleeptalking/walking, night terror/nightmare dimensions and the frequency of OBEs. A number of previous surveys have also found a relationship between anomalous experiences and a number of sleep-related variables: dream recall, dream interpretation, dream control, dream vividness, flying and falling dreams, lucid dreams, and false awakenings (e.g., Alvarado & Zingrone, 1994; Blackmore, 1982b, 1983, 1986; Glicksohn, 1989, 1990; Haraldsson, 1975; Haraldsson, Gudmundsdottir, Ragnarsson, Loftsson & Jonsson, 1977; Irwin, 1985b, 1986a; Kohr, 1980; McCreery, 1993; Palmer, 1979; Rose & Blackmore, 1996). Green and McCreery (1994) have also noted that type 2 false awakenings seem to be particularly versatile and may develop into other experiences, such as lucid dreams, OBEs and apparitional experiences.

Although survey and spontaneous case collections are useful for establishing the phenomenology and incidence of experiences and the circumstances in which they occur, as well as generating hypotheses for experimental investigation, they alone are quite limited in terms of establishing definitively that anomalous processes are involved (e.g., Irwin, 1999; Watt, 1990). The question is do these experiences involve genuine anomalous processes or agencies or are they normal experiences that have been misinterpreted?

Why might the HG/HP and sleep states be conducive to the operation of anomalous processes?

The hypnagogic/hypnopompic states

First of all, the hypnagogic state is considered to be 'unusually receptive' (Schacter, 1976, p. 468) and shares features of what is considered to be a psi-conducive state, such as conscious awareness, physical relaxation, a reduction in sensory distraction and increased internal attention (Braud & Braud, 1975; Honorton, 1977; Mavromatis, 1987). During the HG/HP states awareness of the surroundings may be reduced (Foulkes & Vogel, 1965; Rechtschaffen, 1994) but it is still apparent and people still feel very much awake (McKellar & Simpson, 1954).

Perhaps it is particular levels of brain activity during the hypnagogic/ hypnopompic and sleep states that facilitates the operation of anomalous processes or perhaps it is not actually the ASC itself but the degree or the rapidity of the transition from one state to another (see Parker, 1975). Perhaps the initial increase in alpha activity or the later increase in theta activity is important or, alternatively, it may be the transition or the mixture of states that is important.

It is becoming increasingly apparent that the waking-sleeping-waking transition is not as clear-cut and straightforward as was once thought (e.g., Dement & Kleitman, 1957; Hori et al., 1994; Rechtschaffen & Kales, 1968; Mahowald & Schenck, 1991). In addition, recent evidence from clinical cases and laboratory investigations suggests that dissociated states can occur which consist of a mixture of wakefulness and REM or NREM sleep (Hishikawa, 1976; Mahowald & Schenck, 1991; Takeuchi, Miyasita, Sasaki, Inugami, & Fukuda, 1992; Takeuchi, Miyasita, Inugami, Sasaki, & Fukuda, 1994).

Perhaps these dissociated states, involving some degree of wakefulness that is not usually present, allow access to information or anomalous processes that we are not usually aware of. Unfortunately, this is difficult to actually test out. Clearly not everyone experiences these dissociated states on a regular basis, or if they do they do not remember them; if they did then surely many more people would be reporting anomalous experiences during the HG/HP states. Perhaps the state itself is necessary but not sufficient. For example, sleep-onset REM periods (SOREMPs) might be a necessary but not a sufficient requirement for sleep paralysis (Takeuchi et al., 1992). Perhaps only people with certain personality characteristics or cognitive abilities, such as people who are highly transliminal (Thalbourne & Delin, 1994) or who have thin boundaries (Hartmann, 1991), can operate, or gain access to, anomalous processes during these states. Perhaps only certain people are able to recall the experiences. For example, fantasy-prone people have a good and vivid recall of past personal experiences and they also appear to report a much higher frequency of HG/HP experiences (Wilson & Barber, 1983). This provides further justification for the inclusion of fantasy proneness in addition to measures of various HG/HP and sleep-related experiences in the models to be tested as part of this thesis.

The sleep state

As with the HG/HP states, it could be that certain brain activity is somehow conducive to the operation of anomalous processes. During NREM sleep, the EEG trace is characterised by theta and delta activity and during REM sleep brain activity, paradoxically, resembles that during the normal waking state (Lavie, 1996; Rechtschaffen, 1973). It could also be the transition from one sleep state to another that is conducive; it is known, for example, that a person can oscillate rapidly between states of wakefulness, NREM and REM sleep and that these states can also occur simultaneously (Mahowald & Ettinger, 1990).

Some writers (e.g., Symons, 1993; Tolaas, 1986; Ullman, 1966, 1986, 1990) believe that sleep and dreaming have an internal and/or external vigilance mechanism and that such a mechanism may have a psi component attached to it (Ullman, 1986).

Some writers (e.g., Ullman, 1986, 1990; Tolaas, 1986) believe that we scan our environment for relevant information, particularly novelty, during both waking and sleeping, but point out that a sleeping person is likely to be under a greater risk of harm in some respects. Ullman (1966,1990) considers REM sleep to be periods of increased vigilance which are mainly oriented to the present and the future and which prepare the sleeper for possible adaptive responses. The dream vigilance can result in awakening, if a potential threat is considered to be sufficiently great, or a continuation of the sleep cycle and a return to NREM sleep if no significant threats have been identified (Symons, 1993; Ullman, 1986). Symons (1993) believes that natural selection has disfavoured dreams containing sensory modalities that might compromise the vigilance mechanism. Because a sleeping person is virtually blind and immobile there is no point in monitoring visual and movement inputs and so dreams that include these modalities are not going to be confused with real external inputs. Symons (1993) argues that modalities that are monitored during sleep, such as pain, touch, temperature, smell and hearing, are less common in dreams because they might compromise the external vigilance mechanism. There is also evidence to suggest that this vigilance mechanism is not necessarily restricted to REM sleep; for example, although a person is relatively unresponsive to external stimuli during stages 3 and 4 of NREM sleep, personal stimuli, such as a baby crying, may still produce awakening (Empson, 1993; Lavie, 1996; Rechtschaffen, 1973). Ullman (1986) believes that a psi component to the vigilance mechanism would allow the sleeper to identify (and perhaps react to) significant events which may be distant in terms of space and/or time.

Ullman (1986, 1990) believes that dreaming consciousness serves to maintain species-connectedness and survival. Reports of ESP involving known, emotionally-close persons, who may be in danger, or the appearance of deceased persons in many reports of anomalous dreams would seem to support these proposed functions. However, it has been argued that individual organisms are not primarily concerned with the survival of their species but with the survival of their own genes (Dawkins, 1989); this would contradict Ullman's theory about the maintenance of species-connectedness.

The noise reduction model proposes that, because psi processes seem to be very weak, and therefore difficult to detect, circumstances in which distractions (i.e., external environmental noise and internal somatic noise) are minimised and attention is focused internally will increase the likelihood that anomalous processes can be detected (e.g., see Honorton, 1977). If this model is correct then one might expect that during the HG/HP or sleep states people might be better able to detect extrasensory information or attempted communications from other living or deceased persons, for example.

Why might normal HG/HP and sleep experiences be misinterpreted as involving anomalous processes?

The hypnagogic/hypnopompic states

It has been argued that HG/HP experiences may have been misinterpreted as ESP, apparitions, OBEs/NDEs, visions of previous lives or other worlds, alien abductions, witchcraft or attacks by evil spirits or demons etc. (Baker, 1992; Blackmore, 1996, 1998; Dahlitz & Parkes, 1993; Green & McCreery, 1994; Hufford, 1982; Leaning, 1925; Liddon, 1967; McKellar, 1957, 1989; Mahowald & Ettinger, 1990; Spanos et al., 1993, 1995; Wilson & Barber, 1983; Wing et al., 1994; Zusne & Jones, 1989). Some writers believe that sleep-related experiences may initiate or sustain beliefs in the paranormal and the supernatural and may have contributed to mythology and folklore (Fukuda et al., 1987; Liddon, 1967; McKellar & Simpson, 1954; Mavromatis, 1983; Ness, 1978; Nielsen, 1991). Although certainly some people do attach paranormal, spiritual or supernatural significance to these kinds of experiences, other people are either not very concerned by their experiences or attribute some kind of a normal explanation to them. As McKellar (1957, p. 35) noted, hypnagogic/hypnopompic experiences can mean very different things to different people. Some people may struggle (Siegel, 1993, p. 87) or fail to find an explanation (Rose & Blackmore, 1996) for their sleep paralysis experiences; others may see them as some kind of a dream (Fukuda et al., 1998). Blackmore and Rose (1996) found that many people were scared by sleep paralysis and some were worried that they were going mad or being visited by supernatural entities. A few people may be concerned that their HG/HP experiences may be an indication of possible physical or mental abnormalities (McKellar, 1957, p. 35; Ohayon et al., 1999; Rose & Blackmore, 1996). If such experiences do lead to the development or strengthening of anomalous beliefs then this provides evidence for the experiential source hypothesis.

Assuming that the hypnagogic/hypnopompic and sleep experiences do not reflect anomalous processes, are there any general characteristics of the hypnagogic/ hypnopompic states that might facilitate misinterpretations, regardless of individual knowledge, beliefs and expectations? There may be reduced sensory input from the environment and some ambiguity of external stimuli, especially if the person is in bed and it is dark. This may interfere with accurate reality-testing (Spanos et al., 1993) which also tends to reduce during the sleep-onset period (Foulkes & Vogel, 1965). The sleep onset period cannot be accurately categorised as either waking or sleeping (Hori et al., 1994) and it is sometimes difficult, subjectively, to distinguish between them (Rechtschaffen, 1994). Other features of the sleep onset period include a decreasing awareness of observing the contents of one's own mind, increased absorption, a loss of volitional control over mentation, inaccurate time perception, and a reduction of awareness of the environment (Foulkes & Vogel, 1965; Mavromatis & Richardson, 1984; Rechtschaffen, 1994). Thus, these features of the HG state could lead a person to confuse reality and imagination, particularly if they have become absorbed in their experience, which could in some cases be based upon a mixture of real and imaginary inputs. One of the features of HG/HP imagery that may lead people into believing in their reality and veracity may be that they feel awake throughout. In their survey of hypnagogic experiences, McKellar & Simpson (1954) found that

> Among the reasons given for believing oneself to be awake were: being able to have ordinary perception at the same time (the commonest reason given); being able to have separate thoughts; being able to engage in conversation; being able to open eyes, close them, and continue with the image, etc. (p. 270).

Mavromatis (1987) points out that 'The 'sense of reality, of life-likeness' pointed out by many subjects in reference to their hypnagogic imagery often expands into 'feelings of *heightened reality'.*' (p. 30). Visual imagery can sometimes contain more detail than one might observe in more usual circumstances (Leaning, 1925). Thus, a person might consider an HG/HP experience to be real rather than imaginary because they feel awake and aware of their surroundings, and because the imagery might be very realistic and detailed. The unfamiliarity and involuntary nature of the imagery might also facilitate external attributions. The content of HG/HP imagery (see earlier section) can also be similar to aspects of alleged anomalous experiences and this may facilitate misinterpretations.

Some of the best evidence for the misinterpretation of normal HG/HP experiences comes from the fact that experiences with a paranormal or supernatural interpretation, which are similar if not identical to sleep paralysis with/without accompanying hypnagogic/hypnopompic imagery (Fukuda et al., 1987; Hufford, 1982; Wing et al., 1994), have been reported and are widely known in various countries, regions and cultures: e.g. Canada, USA, Mexico, UK, Germany, Thailand, Korea, China, Japan, India, The Philippines, St. Lucia and the Eskimo regions (Blackmore & Rose, 1996; Dahlitz & Parkes, 1993; Firestone, 1985; Fukuda et al., 1987; Hufford, 1982; Liddon, 1967; Ness, 1978; Ohaeri et al., 1992; Spanos et al., 1995; Wing et al., 1994). Cultural beliefs relating to anomalous agencies seem to be strongly tied to experiences in these different cultures, which supports the experiential source hypothesis (Hufford, 1982).

Old Hag, kanashibari and ghost oppression attacks

Perhaps the most widely-known example of these experiences is the `Old Hag attack' which is well-known in the Canadian province of Newfoundland and is believed to be caused by a supernatural creature, by a human in spirit form (e.g. a witch) or a combination of the two (Firestone, 1985; Hufford, 1982; Kettlewell, Lipscomb & Evans, 1993; Ness, 1978). The main features of an Old Hag attack are an impression of wakefulness and an accurate perception of the real environment, paralysis and fear; secondary features, which may be experienced with eyes open or closed, include a sense of presence, imagined sounds, visual images of a human (e.g. an old woman) or non-human attacker or other events, a sense of motion, pressure (e.g., on the chest), difficulty breathing, odours and other bodily sensations (Hufford, 1982, pp. 267-270). These are all features that have been reported in conjunction with sleep paralysis and HG/HP imagery (Cheyne, 1998; Cheyne, Newby-Clark, & Rueffer, 1999; Cheyne, Rueffer, & Newby-Clark, 1999; Conesa, 1995, 1997; Fukuda et al., 1998; Goode, 1962; Hishikawa & Shimizu, 1995; Hufford, 1982; Liddon, 1967; Mavromatis, 1987; Penn et al., 1981; Schneck, 1960; Snyder, 1983; Spanos et al., 1995; Takeuchi et al., 1992; Terrillon & Marques-Bonham, 1998). An example of an Old Hag experience is as follows:

> And I had the impression that I could hear someone coming behind me. But I said, "Well, I don't—" You know, "They'll pass by." And I could hear the footsteps, and I said, "Well, they're going to pass on by me, and I hope they don't mess with me, whoever they are. I hope it's not somebody who comes by and messes with me." And the next thing I know I heard a female voice and—The voice wasn't really familiar to me. But the voice addressed me like she knew me. Or *it* knew me. And it said, "You knew that I would come." Something like that. And—then there was a lot of talk about her—her face. Or her appearance. And she didn't want me to look at her or something, because of her face. And all this time I remember I had my eyes closed, and I kept thinking, "Well, who *is* this? Who's playing this—Who's who's talking?" And the next thing I know, my—The pressure—on my arms. And I couldn't move. I couldn't move anything... (Hufford, 1982, pp. 81-82).

Experiences with similar phenomenology have also been reported in Japan and China (see below).

> I suddenly woke up from sleep and found that I couldn't move a bit. I couldn't speak, either. I saw a figure, which resembled a Buddhist image, on my stomach. I was very frightened. (Fukuda et al., 1987, p. 282).

> She suddenly woke up in the middle of the night and felt a heavy sensation of weight over her chest during which time she was unable to move and shout. She saw a dark shadow that appeared to be a lady holding a baby in her arms. She felt fearful and exhausted and then fell asleep. (Wing et al., 1994, p. 610).

These experiences are known as 'kanashibari' (Fukuda et al., 1987) and 'ghost oppression attacks' (Wing et al., 1994), respectively, and are believed by some to be caused by evil spirits or possession by a ghost. However, there is evidence to suggest that such beliefs may be more common among people who have not had the experiences themselves (Wing et al., 1994).

Alien abduction experiences

In alleged alien abduction experiences, individuals typically report that they have been abducted by extra-terrestrial beings who took them on board some kind of a spacecraft; here they may be studied or experimented upon, or they may be given information (Bartholomew et al., 1991; Blackmore, 1998; Mack, 1994; Ring & Rosing, 1990; Spanos et al., 1993). Many UFO sightings occur at night and one survey by Spanos et al. (1993) has found that 58% of intense UFO experiences (i.e., those involving contact with aliens and/or features of abduction experiences) occurred around the time of sleep, either during the night or in the early hours of the morning (Mack, 1994). Abduction experiences often begin in a person's home, for example in their bedroom, or when they are out driving; some experiences occur when the person is out walking (Mack, 1994). Hopkins et al. (1992) also noted that:

> A variety of abduction locations have been described, with the encounters taking place at all hours of the day and night. In a majority, however, the abductees awake in bed, fully aware of their surroundings, but physically paralyzed to such a degree that they may not even be able to move their eyes. This state of paralysis often continues for several minutes. The abductees usually sense a presence in the room but very often actually see one or more diminutive large-eyed figures standing beside the bed....Abductees may then be walked or floated towards a landed UFO, but very often they recall rising up in mid-air towards the bottom of a hovering UFO. (p. 12).

The fact that many abduction experiences are sleep-related and include features that are very similar to sleep paralysis and HG/HP experiences has led a number of researchers (e.g., Baker, 1992; Blackmore, 1998; Spanos et al., 1995) to conclude that the latter are more likely explanations for many of these nocturnal abduction experiences. Obviously it is more difficult to see how the HG/HP experience explanation could account for abduction experiences that take place during the day when the abductee is engaged in some form of physical activity but it is a strong candidate for many of the nocturnal experiences.

Features common to both abduction and HG/HP experiences include paralysis, awareness of one's surroundings, visual imagery (e.g., moving balls of light, humanoid figures standing near the bed, complex scenes), auditory imagery (e.g., footsteps, humming, beeping, buzzing, whirring, whispering), a sense of presence, sensations of floating and flying and fear (Baker, 1992; Conesa, 1995; Mack, 1994; Rose & Blackmore, 1996; Spanos et al., 1995). Also of interest is the fact that some abductees report a (childhood) history of HG/HP experiences, such as seeing shadowy figures walk out of their closet (Mack, 1994, p. 77). Others may report a history of sleep paralysis plus bodily vibrations, electrical sensations, a feeling like someone or something was controlling their body or pressure on the chest and a sense of presence (Mack, 1994, pp. 70-71, 122, 221). Thus, it is possible that some abductees might be particularly prone to HG/HP imagery and sleep paralysis. It is possible that the content of such experiences can be influenced by one's knowledge or recent experience, resulting in an abduction scenario. For example, Baker (1992) reported that:

> One of my own clients, after reading both Streiber's Communion and Hopkins Intruders a few days later woke up and saw a tattletale gray face glowing on the wall over his dresser. A few minutes later, following a brief period of sleep, the image of the face reappeared. In his words, "The face was a little bigger than mine. It glowed and had large almond-shaped, jet black eyes bulging out of its forehead. The eyes had no pupils and the face did not look at me straight-on, it was turned a little to the right. I was so mesmerized by the eyes I don't recall any other feature other than vertical wrinkles on its cheeks giving him a creepy crepey look." (p. 9)

Familiarity with abduction accounts seems to be increasing in Western society and such knowledge may not only shape the content of normal HG/HP experiences but may also provide a framework within which to interpret relatively normal sleep-related experiences (Baker, 1992; Rose & Blackmore, 1996; Spanos et al., 1993),

In my view, the best evidence for the fact that normal sleep-related experiences can be misinterpreted as being alien abduction experiences comes from reports of a number of large surveys conducted in the USA by the Roper Organization in 1991 and 1998 (Hopkins et al., 1992; Roper Starch, 1998). The three 1991 surveys involved a total of 5947 adult respondents; the three 1998 surveys, a total of 5955 respondents. In these Unusual Experience Surveys, respondents were asked to indicate whether they had ever had a series of eleven different experiences. Five of these experiences were considered to be "key "indicator" questions designed to elicit experiences related to abduction." (Hopkins et al., 1992, p. 14).

The authors concluded that:

> When a respondent answers "yes" to at least four of these five indicator questions, there is a strong possibility that individual is a UFO abductee. (p. 48).

They also concluded that:

> The incidence of abduction experiences appears to be on the order of at least 2% of the [American] population. (p. 9).

Table 2 Proportion of respondents that reported each of the indicator experiences in the 1991 and 1998 Unusual Experiences surveys

Indicator experiences	1991	1998
Waking up paralyzed with a sense of a strange person or presence or something else in the room	18%	12%
Feeling that you were actually flying through the air although you didn't know why or how	10%	5%
Experiencing a period of time of an hour or more, in which you were apparently lost, but you could not remember why, or where you had been	13%	6%
Seen unusual lights or balls of light in a room without knowing what was causing them, or where they came from	8%	5%
Finding puzzling scars on your body and neither you nor anyone else remembering how you received them or where you got them	8%	5%

Although the sampling and the survey procedure were of a high standard, the conclusions reached on the basis of these responses should not be considered to be valid. Firstly, there does not appear to be a universal agreement regarding what features define an alien abduction experience (Appelle et al., 2000) and so it would be premature to conclude that these indicators definitely reflect abduction experiences without giving a precise definition of what features are crucial; at least four out of five experiences is too vague. Secondly, the validity has been questioned because the survey does not apparently measure the frequency of real abduction experiences (Donderi, 1994; Goertzel, 1994; Klass, 1993; Stires, 1993) and it is not clear whether the proposed indicators are actually valid as indicators of true abduction experiences. Although reports of abduction experiences suggest that these indicators tend to occur during the same episode (e.g., Mack. 1994), one cannot tell whether this is the case from the Roper poll data; a given respondent deemed to be a potential abductee could have had his or her four indicator experiences separately on different occasions. It is not clear whether Hopkins et al. (1992) are assuming that these indicators must occur during the same experience if they are to reflect genuine abductions or whether the person just has a tendency to have the indicator experiences but not necessarily at the same time. If the latter is true then the validity is even more questionable. Hopkins et al. (1992) claimed that they did not directly ask the respondents if they had been abducted for the following reason:

> The major difficulty with such a survey was that the question "Are you a UFO abductee?" would not necessarily reveal the extent of those with potential abduction experiences. As has been pointed out, many such people do not have enough conscious recollection of these events to answer affirmatively. Instead, Hopkins and Jacobs decided to ask about particular "unusual experiences" which research indicated were closely associated with abduction histories. (p. 14).

However, although the overall report (Hopkins et al., 1992) of the results of the three 1991 surveys claims that participants were not directly asked whether they had had an abduction experience, a Roper document relating to one of the three 1991 surveys reveals that respondents were in fact asked to indicate whether they had had the following experience "Having been abducted by the occupants of a UFO." (this item was also apparently used in the 1998 surveys too). Only 8 (0.4%) of the 1971 respondents indicated that they had had such an experience at least once. This is clearly considerably less than the 2% estimate based upon those reporting 4/5 indicator experiences in the overall dataset and seems to contradict what Hopkins et al. (1992) report.

Certainly at least three of the indicator experiences (paralysis, flying, unusual lights) could be reported by a person who has normal HG/HP experiences. The only mention of normal HG/HP experiences comes in a section of the report in which Hopkins and Jacobs describe how the survey was designed. They correctly noted that "A fleeting sensation of paralysis is not unusual in either hypnogogic or hypnopompic states…"(p. 56) but then argued that "adding the phrase 'with a sense of a strange person or presence or something else in the room' forcefully narrows the scope of the question." It may narrow the number of respondents but a sense of presence is also a common feature of sleep paralysis experiences. Changing the item in this way certainly does not rule out normal HG/HP-related experiences. It is surprising that Hopkins et al. (1992) drew the conclusions they did given that they are clearly aware of the existence of normal HG/HP experiences. Hufford (1994) has also noted the similarity between the Roper poll questions and features of sleep paralysis attacks and he has registered his astonishment that the report does not really mention these nor his book on assault traditions, which is a classic text. Thus, in my opinion, the Roper Unusual Experiences surveys clearly illustrate how reports of experiences closely resembling normal HG/HP experiences can be misinterpreted. The HG/HP-like features of many abduction accounts and the fact that some abductees have a history of HG/HP experiences also suggest that normal HG/HP experiences are a more likely explanation for many nocturnal abduction experiences that are reported around the time of sleep in the home.

The sleep state

In relation to the sleep state, the existence of false awakenings, in which we think that we are awake but later find out that we were only dreaming, is a good illustration of the difficulty we may have in determining whether we are asleep or not (Green, 1968; Green & McCreery, 1994). In addition, in pre-lucid dreams we may start to consider whether or not we are dreaming and on some occasions we may reach the wrong conclusion (Green, 1968). Thus, it is possible that if we think we are awake when we are not, we may consider imaginary sleep experiences to be waking reality. There may also be the possibility of some confusion during lucid dreams, particularly if one has simultaneous awareness of dream reality and actual reality. Another possibility might be that flying or falling dreams, which are often closely related to lucid dreams, are interpreted as OBEs.

Type 2 false awakenings might be prone to misinterpretation in some instances where the sleeper apparently wakes up to a tense and stormy atmosphere or begins to feel that some thing is wrong or that something is about to happen (Green, 1968; Green & McCreery, 1994). Such experiences might be interpreted as being precognitive. Ominous noises and/or strange figures may also be apparently seen during such dreams and these might be interpreted as communications with the dead or other beings, for example.

People who suffer from arousal sleep disorders, i.e., confusional arousals, sleepwalking, sleep terrors, might be more likely to misinterpret sleep-related experiences because features of these disorders include misperception of the environment, possible automatic behaviour and varying degrees of recall for events which precede these episodes (Rosen, Mahowald, & Ferber, 1995). Sleep terrors in particular might lend themselves to paranormal interpretations; the person may awaken with a scream and may be temporarily confused and disoriented, may feel very frightened but may not remember what it was that caused them to awaken. Children often report that something was going to get them or was after them, though it may be that this is the result of their attempts to rationalise their fear (Rosen et al., 1995). However, some fragments of dreamlike imagery can be recalled, e.g., a face, an animal or fire (Mahowald & Ettinger, 1990). This might facilitate interpretations in terms of some form of visitation or perhaps seeing future events. Sleep choking episodes also have features that might lend themselves to anomalous interpretations; the choking might be attributed to some invisible nocturnal assailant.

Chapter Summary

This chapter has outlined some of the physiological and experiential features of the HG/HP and sleep states and has noted some of the objective and subjective difficulties that can sometimes occur when attempting to differentiate between sleep and wakefulness. With particular emphasis on the HG/HP states, this chapter has also described two of the main experiential features, which are HG/HP imagery and sleep paralysis.

In terms of the sleep state, this chapter has described the features of a number of fairly normal sleep experiences, such as normal and lucid dreams, flying and falling dreams and false awakenings, as well as other experiences which can be described as sleep disorders, such as sleepwalking, sleep terrors, sleep talking, and nightmares.

This chapter has also shown that the HG/HP states have been associated with a range of anomalous experiences and beliefs and that there is also evidence to suggest that people who report more frequent episodes of certain HG/HP and sleep-related experiences may also report more episodes of anomalous experiences. However, much of this evidence comes from surveys and spontaneous case collections which makes it difficult to establish whether or not any genuine anomalous processes or agencies are involved, given the subjective and often unreliable nature of human testimony.

Why might the HG/HP and sleep states be conducive to anomalous processes? These states share features of what is considered to be a psi-conducive state, e.g., physical relaxation, a reduction in sensory distraction and increased internal attention. It could be that certain levels of brain activity, the change from one state to another or the mixture of sleep and waking states that is somehow conducive to anomalous processes. However, it is also possible that such ASCs are a necessary but not a sufficient requirement; perhaps only people with certain personality characteristics or cognitive abilities, such as fantasy proneness and/or high transliminality or thin boundaries, have the sufficient prerequisites. It has also been argued that the sleep state has an internal or external vigilance mechanism that could monitor beyond current space and time, but this is very difficult to test.

This chapter has also outlined evidence that normal HG/HP and sleep experiences might be misinterpreted as involving anomalous processes and that they may have contributed to the initiation or maintenance of beliefs in the paranormal and the supernatural. During these sleep-related states, it may be difficult to distinguish wakefulness from sleep, there may be reduced sensory input and reality-testing may be interfered with. There may also be vivid and realistic imagery that can be mistaken for reality.

Some of the best evidence for the misinterpretation of normal HG/HP experiences comes from experiences with a paranormal or supernatural interpretation which are similar, if not identical, to sleep paralysis with or without HG/HP imagery. Such experiences include Old Hag attacks, which are well-known in Newfoundland, kanashibari, which are well-known in Japan, and ghost oppression attacks, which are well-known in China.

Finally there is evidence to suggest that HG/HP and sleep paralysis experiences might be mistaken for nocturnal alien abduction experiences. Many abduction experiences are sleep-related and contain features that are similar to sleep paralysis and HG/HP imagery. The best evidence for misinterpreting normal experiences as being alien abduction experiences comes from the Unusual Experience surveys conducted by the Roper Organization in the USA in 1991 and 1998. The authors of reports based upon these surveys concluded that participants who had had at least four out of five indicator experiences during their lifetime had probably been abducted by aliens; on the basis of this they also concluded that at least 2% of the American population have been abducted by aliens. There is little evidence that these indicators are valid and reliable indicators of abduction experiences and a person who had had normal HG/HP experiences could claim to have had at least three of these so-called abduction indicators.

Chapter 5

Investigation of sleep-related anomalous experiences under controlled conditions

There have been relatively few experimental investigations of anomalous experiences during true HG/HP states but many more investigations have attempted to induce, or allow a person to induce, a state that is believed to resemble the naturally-occurring HG state. Attempts have also been made to study anomalous experiences that are reported during sleep, either in the laboratory or in participants' homes. The experiments (or non-experimental inductions) involving HG/HP and sleep states have mainly been concerned with ESP and OBEs. There have also been attempts to induce apparitional experiences using a psychomanteum chamber, which may induce a state resembling the HG state.

This chapter will examine the results of these investigations, plus the features of OBEs and psychomanteum experiences, in order to establish whether there is evidence for genuine anomalous processes or whether there are normal explanations.

ESP

Although there have been numerous reports of ESP during the HG/HP states (e.g., Gurney et al., 1886), very few experimental studies have attempted to investigate this during the naturally-occurring HG/HP states (Braud, 1977; White et al., 1971; Gertz, 1983).

Braud (1977) conducted three telepathy studies in order to investigate whether dreams or HG mentation were more conducive to telepathy. The initial pilot dream study involved 50 participants who participated in the same single trial. Participants slept at their homes and tried to dream about a randomly selected target slide that was being sent by the experimenter between 2.00-2.30am. In the morning the participants coded their dream mentation according to whether 10 categories were present or absent and then sent this information to the experimenter. The target slide was also coded for these same categories and each individual's coding was matched against it. Taking all of the participants' information into account, the mean number of matches was only 3.14 where 5 would be expected by chance. Thus, there was no evidence that participants were able to correctly identify characteristics of the dream target more than one would expect by chance; in fact their performance was almost significantly worse than chance ($p = 0.057$, two-tailed). Braud felt that possible reasons for these findings were that 40% of the participants were strangers (i.e., friends of friends) and the participation request had come as a surprise to them.

In the first of two confirmation experiments, Braud tried to rectify this and selected 10 close friends whom he invited to participate via a personalised letter. In order to compare HG versus dream mentation performance, participants attempted to identify six different targets sent over three consecutive days. Three of the targets were sent at 10pm when the participants would be likely to be entering a HG state; the remaining three targets were sent at 5.30am when the participants would be likely to be asleep. A similar binary coding procedure was employed to code the HG and dream mentation. Unfortunately, only 5 of the 10 participants returned their protocol. Strangely, Braud (1977) did not report the performance for dream versus HG mentation but only reports the overall mean majority score of 6.84, which indicated performance that was significantly greater than chance expectations (CR = 2.84, $p = 0.0045$, two-tailed). Braud's (1977) second confirmation study used the same procedure except that the sending times were changed to 10.30pm and 6.00am. Unfortunately, there were problems with these respondents too; only seven returned their protocols and three of those received were incomplete. In both studies, it is possible that participants who felt that they had not performed well decided not to return their data, thus creating a small file drawer problem. However, the findings from the previous study were replicated and performance was again significantly better than chance expectations (mean score = 6.33, CR = 2.07, $p = 0.019$, one-tailed). Having combined the data from the two confirmation studies together, Braud (1977) found that overall performance was still significantly better than chance (mean score = 6.58, CR = 3.47, $p = 0.00052$, two-tailed). It was also apparent that HG performance (mean score = 7.33, CR = 3.62, $p = 0.00015$, one-tailed) was better than dream performance (mean score = 5.83, CR = 1.29, non-significant) but not significantly so. So, in summary, Braud's studies suggested that, although both HG and dream mentation might be conducive to telepathy, the naturally-occurring HG state seems to be more conducive than the sleep state. However, one should remember that there were relatively few participants and trials in these studies and this problem was compounded by the large proportion of participants who failed to return complete protocols.

Another study that attempted to compare the conduciveness of the naturally-occurring HG/HP and dream states to telepathy was conducted by White et al. (1971). This study involved a comparison of transcripts taken from one of the single participant (Erwin) Maimonides dream studies (see Ullman et al., 1989). Although these states were not experimentally-induced, they may not have been entirely natural because the study was carried out with the participant sleeping in a laboratory rather than in their own home. The results indicated that HG/HP but not dream mentation was associated with significant correspondences to the targets. Again, here is further evidence to support the superiority of HG/HP imagery over dream mentation in terms of alleged telepathy performance.

Two further studies are relevant in which participants attempted to self-induce a HG state in laboratory conditions. In the first of these (Schacter & Kelly, 1975), two participants participated in 16 and 20 trials, respectively. After an initial training session, participants were required to try to induce a HG state using an EEG biofeedback procedure. Whilst the receiver was in this self-induced state, the sender, located in a room three floors above, attempted to send impressions of the target. Participants then viewed eight possible slides compared them against their mentation and then placed the slides in rank order according to the degree of correspondence. Ranks of 1-4 given to the target were deemed a hit; 5-8, a miss. Participant one obtained 10/16 hits (62.5% (MCE = 50%), $p = 0.125$) and participant two obtained 12/20 hits (60.0% (MCE = 50%), $p < 0.005$). These findings are suggestive of possible HG telepathy but again only involve a small number of participants. It is not clear whether the state induced did in fact resemble the naturally-occurring HG state.

In the second of these studies, Gertz (1983) measured the EEG of a single participant as he or she tried to fall asleep. In all there were three sessions scheduled over three consecutive days; each session lasted for about seven hours and began at 9.30am. The telepathy trials took place on day 2. There were 18 10-minute trials interspersed with 10-minute recovery periods. During each trial a randomly-selected slide show was viewed by a sender; however, it is important to note that the order of presentation of the slides within each slide show was not randomised. As there were only 12 possible slide shows, six shows were shown once and six were shown twice. The mentation from trials with the same slide show were combined; on one trial there was no reported mentation so this was excluded, resulting in a total of 11 mentation transcripts. These transcripts were randomised and shown to a blind judge. There were 5 direct hits, which indicated that the participant's mentation had apparently identified target information more often than chance would predict ($p < 0.005$). Sum of ranks for transcript-to-shows judging ($p < 0.0005$) and shows-to-transcripts judging ($p < 0.005$) analyses also confirmed this performance. However, there are two major problems with this study, both of which are acknowledged by Gertz (1983): (1) the nonrandom sequence of each slide show might have resulted in some spurious hits, (2) although the EEG trace followed a pattern not unlike that of sleep-onset, it is not clear whether a HG state was induced and, if so, whether it resembles the naturally-occurring version. In my view, it is unlikely that the participant could have easily fallen asleep during the daytime (especially given the intensive nature of the study and the fact that they had only 10 minutes in which to enter the HG state), unless they had not slept at all the previous evening or the participant suffered from fatigue/boredom. In actual fact the latter is a possibility as the experiment was terminated prematurely on the third day due to the fatigue and irritation experienced by the participant.

Overall, there is some evidence to suggest that the naturally-occurring, or self-induced, HG state can be conducive to telepathy, perhaps even more so than dreaming. However, these studies involve small numbers of participants and/or trials and seem to have been somewhat exploratory. There are problems with the design in some studies too (e.g., Gertz, 1983).

Much of the research involving ASCs in parapsychology has been conducted using the ganzfeld technique, a procedure that is believed to induce a HG-like state (Bertini et al., 1969), to facilitate ESP. Some meta-analyses of ganzfeld studies have concluded that they provide good evidence for ESP, albeit with small effect sizes (Bem & Honorton, 1994; Honorton, 1985) but others have concluded that they do not provide evidence for ESP (Hyman, 1985; Milton & Wiseman, 1999).

The ganzfeld technique was adopted from mainstream psychology; for example, it had been used in the study of HG imagery (e.g., Bertini et al., 1969). It began to be used in parapsychology as part of free-response ESP investigations in the 1970s (Braud, Wood, & Braud, 1975; Honorton & Harper, 1974; Parker, 1975). During a typical ganzfeld (meaning homogenous field) session (Honorton, 1977; but see also Schmeidler & Edge, 1999), halved ping-pong balls are placed over the reclining participant's eyes and a uniform light source (often red) is shone onto their face. This produces a diffuse, unpatterned uniform visual input. The participant often listens to a progressive relaxation tape via stereo headphones to relax them. During the subsequent mentation period, which may last for about 15-35 minutes, a homogenous auditory input is also provided by playing white noise to the participant and he or she is required to give a continuous verbal commentary of any thoughts, feelings or imagery that come to mind. The procedure is meant to induce a psi-conducive state in which the participant is relaxed and has their attention focused internally; the competing sensory noise is reduced and the constant unpatterned input creates "stimulus hunger" (Honorton, 1977).

During the mentation period the participant is attempting to gain information about a randomly-selected target via extrasensory means. In telepathy studies, a remotely-located sender will be viewing and attempting to send information to the participant, known as the receiver, during this time. At the end of the mentation period, the participant removes the eyeshields, views a number of possible targets and then judges the correspondence between their mentation and each of the target possibilities. The experimenter, or the sender, then reveals the identity of the target and the participant finds out whether they were able to identify the target correctly.

Hyman (1985) and Honorton (1985) both critically evaluated 42 ganzfeld studies that had been reported between 1974 and 1981 but came to different conclusions. Hyman (1985) concluded that the database of studies did not provide any evidence for a replicable effect, or any evidence of ESP, and also those studies in the database contained a number of flaws, such as multiple testing, inadequate randomisation, possible sensory leakage, and statistical errors. He also suggested that many of the studies were meant to be exploratory rather than confirmatory. Hyman found that flaws relating to inadequate randomisation and insufficient study documentation were correlated with the significance and effect size of outcome measures suggesting that poorly designed studies may have produced spuriously better results. Although Honorton (1985) acknowledged that there were some problems with the studies in the database, he had strong objections to the way that Hyman had defined and coded some of the flaws in his meta-analysis and concluded that Hyman's flaw analyses were uninterpretable as a result. Honorton (1985) meta-analysed the 28 studies in the database that had provided a direct hits measure of performance. Twelve (43%) of these studies were independently significant and the Stouffer z overall was 6.60 ($p < 10^{-9}$). In addition, 60% of the investigators had reported significant findings, which Honorton interpreted as providing good evidence for a replicable effect.

In summary, Hyman (1985) and Honorton (1985) disagreed about the flaws in the database and whether the database provided evidence for replicable ESP. Nevertheless, they both agreed that there was an overall significant effect that was not due to multiple analysis or a file-drawer effect and that there was a need for better study documentation (to minimise potential errors and/or disagreements during meta-analysis) and to try to identify specific moderators of performance. They also agreed that more stringent studies conducted by a broader range of researchers would be needed in order to resolve the question of whether the statistical effect was due to ESP or not. They decided that a positive step towards this goal would be to join forces and publish some recommendations regarding the standards that future ganzfeld studies ought to reach (Hyman & Honorton, 1986). Hyman and Honorton (1986) made recommendations on issues regarding the control of sensory leakage, randomisation of targets, judging and feedback, multiple analysis, the file drawer and the nature of studies, statistics, documentation and the role of meta-analysis.

The next major development in the ganzfeld ESP debate was the publication of a meta-analysis of 11 new ganzfeld studies (Bem & Honorton, 1994) that complied with Hyman and Honorton's (1986) recommendations. These semi-automated studies, known as autoganzfeld studies, had been conducted by Honorton and colleagues between 1983 and 1989. A meta-analysis revealed a significant overall hit rate of 32% (MCE = 25%, $z = 2.89$, $p = 0.002$, one-tailed), albeit one indicative of only a small effect size ($\pi = .59$). Bem and Honorton (1994) concluded that these more stringent studies had demonstrated a significant but small effect. Hyman (1994) agreed that these studies were methodologically superior but argued that the tests used to check the randomisation procedures were inadequate. Bem (1994) responded by publishing new analyses of the randomisation tests to counter Hyman's inadequacy claim. Nevertheless, all agreed that there was still a need for independent replication of these findings by a broader range of investigators (Bem, 1994; Hyman, 1994; Bem & Honorton, 1994).

Milton and Wiseman (1999) presented a meta-analysis of 30 ganzfeld studies that also met the Hyman and Honorton (1986) guidelines but had also been conducted at seven different laboratories by ten different main authors. Unfortunately, these studies failed to confirm the earlier research and the overall performance was not significantly better than chance expectations (Stouffer $z = 0.70$, $p = 0.24$, one-tailed, effect size = 0.013). Milton and Wiseman (1999) suggested that this failure to replicate could have been a result of better methodological controls employed in these studies or that the autoganzfeld studies may have been conducted in psi-conducive conditions that were not apparent in the later studies. Milton and Wiseman's (1999) meta-analysis has been criticised for the inclusion of what some researchers consider to be non-standard ganzfeld studies (e.g., those involving musical targets) but there seems to be a lack of agreement over what the standard features of a ganzfeld study actually are (Milton, 1999; Schmeidler & Edge, 1999). Milton (1999) later reported an updated version of the Milton and Wiseman meta-analysis that included studies published up until March 1999. The revised database did show a statistically significant small effect (Stouffer $z = 2.28$, $p = 0.011$, one-tailed) but this was maintained only by the inclusion of one very successful study by Dalton (1997). However, Milton (1999) pointed out that the effect size had still not been replicated and in fact was significantly lower than that obtained in earlier meta-analyses. As with the Hyman (1985) and Honorton (1985) meta-analyses there are disagreements over the interpretation of the results (see Schmeidler & Edge, 1999) of the Milton and Wiseman (1999; Milton, 1999) meta-analyses and these relate partly to the way the meta-analysis itself was conducted. Milton (1999) suggested that future meta-analyses ought to be prospective and specific criteria for the inclusion/exclusion of studies should be made in advance in the hope of establishing whether studies, conducted by a broad range of investigators at different laboratories, that meet the Hyman and Honorton (1986) guidelines can replicate the statistical effect and also the effect size found in earlier meta-analyses.

The major problem with ganzfeld research as evidence for the psi-conduciveness of the HG state is that it is not clear whether the ganzfeld technique actually induces an ASC and, if so, how effectively (Alvarado, 1998a). Furthermore, it is not certain whether the state induced does actually resemble the naturally-occurring HG state (Braud et al., 1975; Schacter, 1976). There appear to be only two published studies that have monitored the receiver's EEG during a ganzfeld ESP study (McDonough, Don, & Warren, 1994; Wackermann, Pütz, Büchi, Strauch, & Lehmann, 2000) and one (Gertz, 1983) that has monitored it during attempts to enter the HG state naturally, albeit during the daytime in non-ideal circumstances.

Unfortunately, the McDonough et al., (1994) study only analysed and reported the EEG findings prior to the mentation period (even though EEG was monitored throughout). However, they did find that psi-hitters and psi-missers showed different brain states just before the mentation period; hitters had more power in the alpha and beta bands whereas missers had more power in the theta and delta bands. They also found a marginally significant increase in alpha power and a possible reduction in delta and theta activity following the relaxation period. Such an increase in alpha activity is consistent with the situation at the very beginning of the HG state when a person is relaxing (Parker, 1975; Rechtschaffen, 1994). Gertz (1983) found that psi-hitting mentation was significantly more dreamlike than psi-missing, found a significant positive correlation between the dreamlike nature of mentation and the percentage of time spent in theta activity, and a significant negative correlation with the mean frequency of the waveforms. So there is some physiological evidence to suggest that, the relaxation procedure, at least, is associated with changes in EEG output that are similar to those at the very beginning of the HG state.

In a recent study, Wackermann et al. (2000) compared the EEG activity of participants in waking, ganzfeld, sleep onset and sleep stage 2 conditions to see if the ganzfeld truly does induce a state resembling the HG state. They concluded that "[C]ontrary to the common belief, the ganzfeld does not necessarily induce a true hypnagogic state, and will surely not do so in most ganzfeld settings." (p. 302). Brain activity during the ganzfeld condition was more similar to the relaxed waking condition and there was no evidence of a shift towards slower EEG frequencies, such as theta and delta, which is characteristic of sleep onset. However, one should note that in Wackermann et al.'s (2000) ganzfeld condition participants did not undergo any form of progressive relaxation procedure and did not provide a continuous report of their mentation. These are features of many ganzfeld ESP studies and it is not clear whether these may be important in facilitating induction of a HG state. Although this study requires replication, it does suggest that the ganzfeld technique does not induce a HG state and therefore ganzfeld studies probably cannot provide experimental support for the psi-conducive nature of the HG state.

A number of experiments have also been conducted in order to establish whether there is any evidence for dream ESP. The rationale for such research is that a large proportion, estimated to be 33-68% (Van de Castle, 1977), of spontaneous cases of extrasensory perception (ESP) have been reported during dreams (e.g., Gurney et al., 1886). Dream ESP has also been reported frequently by clients undergoing psychoanalysis (see Van de Castle, 1977).

As with ESP research in general (Sargent & Harley, 1982), the majority of experimental studies of dream ESP have focused on telepathy or clairvoyance (e.g., Braud, 1977; Child, 1985; Child, Kanthamani, & Sweeney, 1977; Dalton, Utts, Novotny, Sickafoose, Burrone & Phillips, 2000; Dalton, Steinkamp, & Sherwood[6], in press; Kanthamani & Broughton, 1992; Sherwood, Dalton, Steinkamp, & Watt, 2000; Ullman et al., 1989) rather than precognition (e.g., Besterman, 1933; Sargent & Harley, 1982; Sherwood, Roe, Simmonds, & Biles, 1999).

The Maimonides dream studies (Ullman et al., 1989) are undoubtedly the most well-known and most successful (Child, 1985). A dream laboratory was set up at the Maimonides Medical Center in 1962 and research continued there until the lab closed in 1978. The Maimonides dream ESP research program comprised of 12 formal experimental studies and a number of pilot studies (see Child, 1985; Ullman et al., 1989; Van de Castle, 1977). The Maimonides studies were mainly set up to test for dream telepathy or clairvoyance but there were two experimental sessions and two experimental studies on precognition (see Child, 1985; Krippner, 1991).

During a typical Maimonides telepathy trial, the participant (receiver) would be sleeping in a soundproof room in the laboratory and would be attached to EEG monitoring equipment. Once the receiver was asleep, a target (typically an art print) would be selected, using random number tables, and given to the sender who would then go to another room in the building and be locked inside. The experimenter would monitor the receiver's EEG all night and once the EEG indicated that the receiver had entered REM sleep, the experimenter would signal the sender (via a buzzer). This was to make sure that he or she was awake and to cue him or her to begin their attempts to send information about the target picture to the sleeping receiver. After 10-20 minutes in REM sleep, the experimenter would awaken the receiver via an intercom and ask him or her to describe their dream(s) in as much detail as possible. The receiver was then allowed to go back to sleep until the next REM period when they were again awakened in a similar fashion. This process was repeated throughout the night with the same target being sent on each occasion. In the morning, the receiver was asked to report any associations to their dream mentation and to report what they thought the target picture might be. They were also shown eight or twelve pictures, one of which was the target, and asked to give a confidence rating for each picture and to place them in rank order according to their

[6] Copies of the Dalton, Steinkamp, & Sherwood (in press) and the Sherwood, Dalton, Steinkamp, &

correspondence with their dream mentation. Complete dream transcripts and target sets were also sent to independent judges who were asked to give similar ratings and rankings. Trials were considered to be a hit if the target picture had been ranked in the top half of the target set (i.e., if there were 8 possible targets a rank of 1-4 would be a hit).

Child (1985) encountered two main areas of difficulty when trying to evaluate the Maimonides research findings: (1) the analysis had been passed to various consultants, much of the analysis was not conducted at the time of the studies, and the raw data are no longer available; (2) some of the blind judges' judgements may not have been completely independent, even though they had been specifically instructed not to let their judgement of one picture influence their judgement of others. However, Krippner (1991) pointed out that the blind judging procedure was altered once this had become apparent. Nevertheless, Child (1985) concluded that:

> The outcome is clear. Several segments of the data, considered separately, yield significant evidence that dreams (and associations to them) tended to resemble the picture chosen randomly as target more than they resembled other pictures in the pool. (p. 1223).

A recent meta-analysis of 450 Maimonides dream ESP sessions found the overall hit rate to be 63% (mean chance expectation (MCE) = 50%) with odds against chance of 75 million to one (Radin, 1997). Attempted replications of the Maimonides dream studies (Belvedere & Foulkes, 1971; Foulkes et al., 1972; Globus, Knapp, Skinner, & Healy, 1968) have been few (Child, 1985) and have not been so successful, though the conditions surrounding these attempts may not have been particularly conducive (see Van de Castle, 1977). This lack of replication by other investigators at other laboratories is perhaps the most serious criticism of the Maimonides studies (Krippner, 1991). It has also been suggested that the Maimonides results may have been due to inadvertent cues in the transcripts sent to blind judges (Clemmer, 1986). In response to this criticism, Krippner (1991) noted that the transcripts had been examined for such cues or mention of previous targets

---

Watt (2000) papers can be found in the Appendices.

before they were sent to the judges and, in addition, that this would still not account for the significant findings based upon the participants' judgements.

A number of other studies have investigated dream telepathy (Braud, 1977; Child et al., 1977; Hearne, 1987, 1989), dream clairvoyance (Dalton, Utts et al., 2000; Dalton, Steinkamp, et al., in press; Harley, 1989; Kanthamani & Broughton, 1992; Kanthamani & Khilji, 1990; Kanthamani, Khilji, & Rustomji-Kerns, 1989; Markwick & Beloff, 1988; Sherwood, Dalton, et al., 2000), or dream precognition (Dunne, 1927/1958; Sargent & Harley, 1982; Sherwood, Roe, et al., 1999). These studies differed from the Maimonides studies in that the participants slept at their own homes rather than in the laboratory. Some of these studies obtained performances based on dream mentation that were significantly better than chance (Child et al., 1977; Kanthamani & Khilji, 1990; Dalton, Novotny et al., in press; Dalton, Steinkamp et al., in press; Sherwood, Dalton et al., 2000), but others did not (Braud, 1977; Hearne, 1987, 1989; Kanthamani et al., 1989; Sargent & Harley, 1982; Sherwood, Roe et al., 1999); one study obtained significant psi-missing (Harley, 1982). Some studies have compared ESP performance associated with dreaming with ganzfeld or HG/HP mentation; the majority of these found that dreams seemed to be more conducive than ganzfeld mentation (Kanthamani et al., 1989; Kanthamani & Broughton, 1992; Kanthamani & Khilji, 1990) but other studies have found that naturally-occurring HG/HP mentation is more conducive than dreams (Braud, 1977; White et al., 1971).

However, although many of these other non-Maimonides studies have obtained significant positive results, these studies do have some problems. Many of them rely on few participants and a small number of trials. In addition, some studies conducted multiple tests of significance using different types of analysis and, in some cases, only reported the results of some of these analyses.

So, in my opinion, there is evidence to suggest that the HG/HP and dream states are conducive to ESP although the effect size is small. Although the ganzfeld studies provide evidence for a similar small effect, it is not clear whether the induction procedure does induce a state that resembles the naturally-occurring HG state and so cannot be taken as evidence for the psi-conducive nature of the HG state. There is a trend that suggests that the naturally-occurring HG/HP states might be more psi-conducive than the sleep state which is in turn more conducive than the ganzfeld state. However, more research involving repeated measures designs is needed to verify this trend.

OBEs

Mavromatis (1987, p. 131) has argued that OBEs and HG/HP phenomena are similar in terms of the psychophysical conditions in which they occur and also in terms of their phenomenology. If this is true then a greater understanding of the HG/HP state may lead to a greater understanding of the nature of OBEs and vice versa.

Many OBE induction procedures tend to encourage HG-like states or use the HG state as a starting point (Mavromatis, 1987; Palmer, 1978a). OBE induction techniques often tend to promote physical relaxation, sensory restriction or bombardment, as well as positive expectations and motivation (Blackmore, 1982a; Irwin, 1994a, p. 228). Imagery generation and control is also used in some techniques (see Blackmore, 1982a, pp. 94-106). Muldoon and Carrington (1929/1974, p. 70) suggested that 'astral catalepsy' (which is similar to 'sleep paralysis') is conducive to voluntary OBEs, particularly if it occurs in the HP state. Green (1968, pp. 58-59) gives an example of a deliberate attempt to induce an OBE by one of her participants:

> Each night in bed, lying on my back, I relaxed my body piece by piece, starting from the toes until, finally reaching the eyes, one was supposed to concentrate on an imaginary void between the eyebrows, then, filling it with a flower image, allow this to develop into full flower.
>
> For weeks I simply fell asleep at waist level, as it were, and gradually the idea of leaving the physical body became neglected, although the ritual of relaxing had become a habit . . .
>
> Then one night in the drowsy state before sleep I was aware of a small sensation which might be likened to a tablet of soap slipping from one's grasp in the bath. I was awake . . . I turned to look at my husband and was vaguely surprised to find that I was looking down on him and as I looked I rose higher and saw my sleeping form next to his.

These OBE induction techniques are similar to a technique for inducing HG images described by Playfair (1985, p. 108):

> I soon found I could have a hypnagogic image almost every time I wanted one, and here is what I do....I close my eyes and think 'blue' until my field of vision goes uniformly blue. Then I go into a state of what Zen teachers call relaxed concentration, which is the same as what the biofeedback scientists call passive volition. This involves doing absolutely nothing except lie and wait for something to happen and—most importantly—*assume* that something is going to happen. You must make no conscious effort, but you must have no doubts at all. Just switch off your left mind and wait. You might find it helpful to visualise yourself going round a large empty room turning off lights and pulling out plugs until the left mind is all dark and silent.
>
> Next I imagine I am the only spectator at a vast open-air drive-in cinema somewhere up a mountain, waiting for the programme to begin, and not knowing (or caring) what the film is to be. Then I usually notice small stars appearing here and there. I choose one and concentrate on it in a vague and disinterested way. Sometimes it disappears, in which case I simply wait for the next one. Eventually, one of the stars explodes into a fully-formed hypnagogic image. These images tend to wobble around a bit, but can be kept still with practice.

Palmer (1978a) has attempted to develop experimental procedures for inducing OBEs in participants who do not necessarily have a history of OBEs or paranormal experiences. If participants successfully had an OBE during a session, they were required to try to visit another room and look at a randomly-selected target picture. The procedures used included progressive relaxation, use of a rotating spiral disk, monotonous tones, vibrations and ganzfeld techniques. Use of the spiral disk and the vibrating bed were not found to be very conducive (Palmer, 1978a). Palmer (1978a) reported that, over four studies, half of the participants reported at least one experience that they believed to be an OBE. Most of these OBEs occurred spontaneously and participants did not have much control over them. When the induction procedure involved monotonous masking of sound and eyeshields or closed eyes, participants who reported OBEs scored significantly better than chance at correctly identifying the remote targets and also performed significantly better than participants who did not report OBEs (Palmer, 1978a). This could be interpreted as meaning that participants were actually able to leave the room to view the target or, alternatively, perhaps the OBE state is simply conducive to ESP.

In a more recent study, McCreery and Claridge (1996a, 1996b) attempted to induce OBEs experimentally in a group of participants who had experienced at least one OBE in the past and also in a control group. They used a method similar to that developed by Palmer and colleagues. Imagery reported by participants in McCreery and Claridge's (1996a) study included visual imagery, weightlessness, distortions of body image and isolated cases of auditory and tactile imagery. Five of the 40 participants reported feeling as if they had actually left their body; three were uncertain or felt that they had almost succeeded. OBE induction procedures that attempt to induce features of the psi-conducive state, one form of which might be a HG-like state, do seem to have had some success in inducing OBEs.

A small number of experimental studies have monitored the psychophysiology of individuals who are able to induce OBEs voluntarily or who experience OBEs fairly regularly (see Blackmore, 1982a, pp. 121-132; Krippner, 1996; Morris, Harary, Janis, Hartwell, & Roll, 1978; Osis & Mitchell, 1977; Tart, 1967, 1968, 1969a; Twemlow, 1977). During these sessions, these individuals have either been in a state of relaxed wakefulness or in a sleep-related state.

The results suggest that there may be some unusual EEG activity, perhaps indicative of mixed dissociated states, in some individuals as they are trying to induce an OBE. For example, Miss Z experienced rapid eye movements (REMs) during Stage 1 sleep (Tart, 1968); Robert Monroe's EEG activity showed unusually varied alpha and high voltage theta waves and his sleep patterns seemed to be lacking in Stages 3 and 4 (Tart, 1967); in a 1966 study involving an individual who reported occasional OBEs, the EEG for the period of sleep in which an OBE was reported showed "an unusual pattern of slow brain waves in the theta and delta frequencies, interrupting REM sleep…" (Krippner, 1996, p. 90).

Research into the psychophysiology of the HG state has found some similarities with that during OBEs, particularly if the OBEs are sleep-related. Studies of EEG activity during the transition to sleep have found that the shift can be quite abrupt and that there are frequent fluctuations between wakefulness and sleep (Baddia et al., 1994; Oswald, 1962, p. 100). The studies of Miss Z and Robert Monroe, who both went to sleep during their OBE sessions, tentatively suggested that their OBEs may have occurred during Stage 1 sleep or the transition to Stage 2 (Tart, 1967, 1968, 1969a). Their EEG traces were also interrupted by periods of drowsy, relaxed wakefulness and showed periods of alphoid and theta activity and few or no REMs (Tart, 1967, 1968, 1969a; Twemlow, 1977). Although Tart (1968) suggests that Miss Z's OBEs could have occurred during the HG state, he notes that the level of alphoid activity in her EEG was not typical of the HG state.

It is also interesting to note that in McCreery and Claridge's (1996b) study, the average median EEG frequency over time for both brain hemispheres tended to be higher in the OBE group and in the alpha band (min. 8.8Hz, max. 9.7Hz) and the EEG in the right hemisphere for the OBE group tended to increase across the task. The median EEG frequency in the left hemisphere for the OBE group and in both hemispheres in the control group decreased across the task. As Healy (1986) points out, other participants such as Keith Harary and Ingo Swann have also reported OBEs during non-theta states.

Some of the OBE studies were carried out with Ingo Swann and Blue Harary, who did not sleep but were both relaxed and awake during the trials (Osis & Mitchell, 1977; Morris et al., 1978). As with Miss Z, Swann's results demonstrated flattened EEG activity and a decrease in alpha during his OBE (Blackmore, 1982a; Mitchell, 1978; Osis & Mitchell, 1977). Osis and Mitchell (1977) also noted that Swann's eye movements tended to stop whilst he was experiencing his OBEs. Blue Harary also showed slightly fewer eye movements during his OBEs but no significant change in alpha frequency or percentage alpha time, although there was a reduction in percentage alpha time in the right hemisphere (Morris et al., 1978). Studies using home-monitoring equipment have suggested that brief periods of eyelid quiescence are correlated with a reduction in alpha and may precede the appearance of HG imagery (Rowley, Stickgold, & Hobson, 1998; Stickgold & Hobson, 1994).

In summary, it is clear that both OBEs and HG/HP phenomena can occur in similar psychophysical conditions and that some people may have some degree of control over when they occur and how the experience progresses. Physical relaxation, sensory restriction or bombardment, emotional calm and positive expectations or passive volition all seem to be conducive factors. The results of the physiological studies of OBEs suggest that there is no precise and discrete physiological state associated with the OBE (Blackmore, 1982a). However, there is some evidence that sleep-related OBEs may be associated with some unusual EEG activity and may take place during the HG state (roughly equivalent to Stage 1 sleep) or the transition to sleep Stage 2. These stages may contain alpha and theta activity and fewer or no REMs and may be interrupted by periods of wakefulness. There is also some evidence that flattening of EEG activity may occur in both waking and sleep-related OBEs.

There are also phenomenological similarities between HG/HP experiences and OBEs. For example, various HG/HP features have also been reported before, during, or just after OBEs (e.g., Green & McCreery, 1994; Mavromatis, 1983, 1987; Muldoon & Carrington, 1929/1974). In the following section, some of the similarities and differences between HG/HP and OBE features, with reference to selected quotations from accounts of both kinds of experiences, will be outlined.

Both HG/HP imagery and OBEs may gradually develop or may suddenly become apparent; some people may also be able to induce or control them in some way. Some people have also reported being able to hold a conversation during these experiences (Blackmore, 1982a, pp. 2-3; Mavromatis, 1987, p. 28).

Features common both to the HG/HP states and OBEs include imagery of various modalities (especially body schema distortions, visual, auditory, movement, bodily, thermal and tactile sensations). Experients may report heightened senses (Arnold-Forster, 1921, p. 161; Green, 1968, p. 72; Mavromatis, 1987, p. 136) during the experiences, which often tend to be mainly visual and auditory with some sensations of movement. Sleep paralysis has been reported before, during or just after OBEs (e.g., Green, 1968, p. 60-61; Green & McCreery, 1994, p. 78, 84; Harary, 1978, p. 268; Muldoon & Carrington, 1929/1974, p. 70; Salley, 1982). Bodily shocks or jerks, which are similar to sleep starts, have also been reported towards the end of OBEs (Alvarado & Zingrone, 1997; Irwin, 1994a, p. 229; Oswald, 1959). HG/HP and OBE experiences can also be terminated by some form of excitement (Blackmore, 1982a; Mavromatis, 1987, p. 139).

> I was jolted back into my body. I felt as if I had crash-landed into it. It was painful, jarring my body, especially my head and neck, and I felt shocked. (Alvarado & Zingrone, 1997, p. 305). [OBE]

> A sensation of falling or tripping, which caused me to jerk or move, waking myself up [HG/HP]

The visual imagery experienced during OBEs and the HG/HP states may be very detailed, colourful, detailed and may seem to be strangely illuminated. Percipients sometimes report that the imagery is viewed from an illusory perspective, such as from above (Alvarado, 1997b; Mavromatis, 1987).

> I remember turning my head and looking downwards at myself lying flat on my back in bed. (Green, 1968, p. 43). [OBE]

> Once as a child, I had the sensation of looking down upon my sleeping body. (This person did not report that their centre of awareness seemed to be outside of their body). [HG/HP]

In terms of similarities between the visual imagery experienced, both HG/HP imagery and OBE imagery may develop from mist or clouds or may be seen within a circular opening (Gurney et al., 1886, p. 277; Leaning, 1925, p. 313; Purcell, 1997; Whiteman, 1978, p.278):

Surroundings viewed may be similar to the actual surroundings or may involve familiar or unfamiliar land- and sea-scapes (Blackmore, 1982a; Leaning, 1925; Mavromatis, 1987).

> From the ceiling I could apparently see the room quite clearly. I saw the desk, chairs, window, my friends and myself all from above....I visited Paris and New York and flew over South America....In the Mediterranean I visited 'a star-shaped island with 100 trees'. (Blackmore, 1982a, pp. 3-4). [OBE]

> Flying and seeing landscapes as if from an airborn perspective. [HG/HP]

The experient may also report seeing lights, faces, figures or entities or may simply report a sense of presence (Alvarado, 1997b; McCreery & Claridge, 1996a; Mavromatis, 1987; Ohayon et al., 1996).

> I was aware of seeing a light to my left side, moving up beside me, perhaps slightly higher. It was sort of ball shaped, whitish color. (Alvarado, 1997b, p. 280). [OBE]

> I once saw a blue glowing ball about the size of a football, hov[er]ing in my room... [HG/HP]

In terms of auditory sensations, voices and clicking, snapping or buzzing sounds have been reported (Alvarado, 1997b; Salley, 1982). Unusual sensations in the head and cracking sounds resemble exploding head symptoms in some ways.

> The energy surge comes on and I heard voices as usual, though couldn't make out what was being said. A bit like listening to a radio in someone else's room. A bit like a disc jockey rambling on but just a few seconds. (Alvarado, 1997b, p. 269). [OBE]

[V]oices-many-crossed conversations- like listening to a hundred radio broadcasts simultaneously, sometimes whispers or actual words spoken out loud and seemingly directly to me. [HG/HP]

I felt roaring sounds in my ear and bright flashes around my head and thumping noises. My body became lighter and lighter and I felt a strong floating sensation but due to my struggles I was moving like a yoyo. I did not completely go out of my body, but while only with the top half of my body, and then I was jolted back very unpleasantly and found myself panting and aching all over and able to move my body again. (Alvarado, 1997b, p. 293). [OBE].

Felt sensations of Wind over my body and have experienced almost explosive sounds (bangs!) occurring in my head. [HG/HP]

In terms of bodily sensations, body distortions such as shrinking and expanding, vibrations (Harary, 1978, p. 261; McCreery & Claridge, 1996a; Salley, 1982) and shaking, the passage of energy and weightlessness and heaviness are common to both states (Mavromatis, 1987; Oswald, 1962).

I realized I was rather small to fit inside a part of my own body, and so I tried to imagine myself larger. This attempt overshot and I found myself steadily expanding, like something out of *Alice in Wonderland.* (Blackmore, 1982a, p. 4) [OBE]

Sometimes I feel like my body is growing or shrinking in reference to other things and even itself! [HG/HP]

I occasionally experience vibrational waves which vary in intensity and which flow through my body while in an out-of-body state. (Harary, 1978, p. 268) [OBE]

[B]uzzing vibration through my whole body. [HG/HP]

The "surge" is like energy, almost a bit like liquid, suddenly flowing from the top of the head down the body. (Alvarado, 1997b, p. 269). [OBE]

A pulsating swirl of electrical energy surrounding and eminating (sic) from my entire body. [HG/HP]

In terms of tactile sensations, people have reported both being touched and touching objects or other beings (Alvarado, 1997b; Mavromatis, 1987).

[S]ome "thing" enveloped me like two arms clasping my out of body self from behind (Alvarado, 1997b, p. 270). [OBE]

Sensations of trying to flee and being held back by pulling on my left arm. [HG/HP]

In terms of movement sensations, feelings of floating and drifting, falling, passing through a tunnel, and swinging and rocking have all been reported (McCreery & Claridge, 1996a).

> I can't remember if I had been asleep or not. I just remember feeling what I called my "puffy" feeling which is hard to describe. It involved my head and also a spongy strange sensation like biting or trying to with my gums as if I had no teeth, then sort of shrinking and being sucked through something very very narrow and I think feeling a sort of pressure like a balloon being blown up and then deflated. The next thing I remember is being aware with some surprise of soaring up into the night sky. (Alvarado, 1997b, p. 280). [OBE]

> Most common is the sensation of falling. The "pull" is always centered in the small of my back, giving the sensation of being sucked into a hole. [HG/HP]

> Falling up through the celling (sic)! Falling upward. Entering or passing through a tunnel. Entering a state of greyness. [HG/HP]

Similar cognitive aspects of the two types of experience may also include a sense of oneness with the surroundings or a feeling of all-knowing and understanding (Mavromatis, 1987, pp. 149-150).

One characteristic that may be common to both OBEs and HG/HP experiences is that the phenomenology may be the result of the mixing and integration of both internal and external input that may be from real or self-generated information. What this means is that the imagery and sensations may be based upon real sensory input from one's physical body or the environment (which may be elaborated upon) plus internally-generated inputs. Some of the psychological/neurophysiological theories of HG imagery (see Mavromatis, 1987; Mavromatis & Richardson, 1984) suggest that it is normal sensory data that has been elaborated or that it is wholly (or perhaps partly) generated within the brain. Perhaps the HG/HP imagery is the result of the brain trying to make sense of information presented during states that are a mixture of sleep and wakefulness and/or it reflects a shift in attention from the external to the internal and vice versa.

According to Blackmore's (1982a) psychological theory of OBEs, vivid and detailed imagery, low reality-testing and a reduction in sensory input from the body (or a shift in attention away from it) are important prerequisites, plus a continuation of awareness and logical thinking. Interestingly, one of the common features of HG/HP imagery is that people do feel awake throughout (McKellar & Simpson, 1954). According to Blackmore's theory, the focus on internal mentation and away from the body can lead to the creation of an alternative body image that is not located within the physical body. So long as the imagery continues to be vivid and detailed, the OBE will continue; if the quality of imagery declines and/or attention is drawn back to the normal body image then the OBE will end. An interesting point to note here is that some OBEs end with a sudden jerk (Alvarado, 1997a; Alvarado & Zingrone, 1997); we know too that during the HG state people may sometimes experience sleep starts (ASDA, 1990; Oswald, 1959), which are basically sudden jerks of the body or limbs. If a sleep start occurred during a HG OBE then this might draw attention back to the physical body thus terminating the OBE with a shock or jerk.

A reduction in feedback from the body is also an important component of Palmer's (1978b) theory of OBEs. His theory postulates that the majority of OBEs evolve from the HG/HP states and that this lack of feedback constitutes a threat to a person's sense of self. Palmer proposes that a person tries to re-establish the sense of self; one way of doing this is via creation of an OBE. Palmer also believes that HG/HP imagery forms the basis of the sensory aspects of the OBE. Although this has been challenged by Irwin (1994a, p. 245), who argued that the features of HG imagery—e.g., bizarreness, disconnected, rapid change, lack of control, tendency not to relate to self—are not typical of OBEs, I would argue that HG/HP imagery could perhaps form the basis of some OBEs. One of the problems with Palmer's theory is that it is difficult to establish whether or not a person's self-concept is under threat during OBEs because Palmer suggests that the person is unlikely to be aware of the threat or change to their body image.

As with Blackmore's (1982a) theory, a shift of attention away from somatic sensory input towards internal mentation is also a feature of Irwin's (1985b) synesthetic model of OBEs. Irwin postulates that such a shift is caused by a person becoming habituated to the somatic input. The reduction in awareness of the physical body leads to an impression that awareness is no longer associated with it. The somatic input still exists but becomes transformed by synesthetic processes into an OBE experience. Again, as with the theory of HG imagery mentioned earlier, it is postulated that normal sensory input somehow becomes elaborated into a more complex imaginary experience. Irwin's model seems to differ from those of Blackmore (1982a) and Palmer (1978b) in that a reduction in somatic input does not appear to be necessary; in both of these other theories, a reduction in such input is specifically mentioned. It also differs in that real sensory input, rather than imagery, is the initial basis for the experience.

The common aspects of these psychological theories of HG imagery and OBEs are that normal sensory input may somehow be transformed, possibly synesthetically, into more complex imagery and that there may be an accompanying shift in attention from the external towards the internal (which may be partly due to a reduction in sensory input). One of the merits of these psychological theories of OBEs is that they are relatively parsimonious and do not involve astral bodies; they also take account of the circumstances in which many OBEs occur (Blackmore, 1982a). Although there are great similarities between a number of specific features of HG/HP imagery and OBEs, where they differ crucially is that in the latter there is a definite change in body concept/sense of self. Thus HG/HP OBEs may be a special form of HG/HP imagery.

One particular variable that warrants further attention in relation to OBEs and HG/HP imagery is that of field dependence/independence (see Witkin, Dyk, Faterson, Goodenough, & Karp, 1974). Field dependence/independence is essentially a measure of cognitive style: field dependent people tend to perceive their environment globally and may have difficulty in separating aspects out from the background environment; field-independent people tend to be more analytical and are better able to separate out discrete aspects from the background environment (Witkin et al., 1974, p. 35). Field-dependent people, who may have some difficulty in separating internal and external sensory cues, appear to be more likely to experience realistic imagery during sensory deprivation and ganzfeld conditions (Bertini, Lewis, & Witkin, 1969; Reed, 1988) and are more likely to attribute imagery to external sources (Reed, 1988).

Thus, it would seem that field-dependent (FD) people are probably more likely to experience HG/HP imagery and that this might be influenced by external sensory inputs. However, FD people are also reported to have relatively undifferentiated body concepts and a relatively undifferentiated sense of separate identity and tend to experience difficulty in differentiating between awareness of their own body and awareness of their surroundings (Bertini et al., 1969; Reed, 1988). Although it seems that FD people may be more likely to experience HG/HP imagery, it seems that they might be less likely to perceive a separate sense of self (unless this changes during HG/HP imagery) and therefore might be less likely to experience an OBE. If this is true then perhaps HG/HP imagery and OBEs may not be as closely linked after all? It would be useful to conduct some research to test whether FD and FI people are significantly different in the above directions in terms of their reports of HG/HP imagery and OBEs.

Nevertheless, even though these experimental studies support the conduciveness of the HG/HP and sleep states to OBEs, they do not indicate that any anomalous processes are involved. Morris et al. (1978) did attempt to detect their participant's out-of-body self at a remote location during his OBEs using a variety of human, animal and physical detectors. The human detectors reported significantly more impressions of a visit during OBE periods than during non-OBE periods and a kitten was observed to be significantly less active and less vocal during OBE periods. However, in two later studies, the kitten showed no definite orientation toward the location visited by the participant during his OBEs. The physical detectors did not detect any significant environmental changes either. Even if the human/animal detectors were apparently able to identify the OBE periods, it does not necessarily follow that some aspect of the self was actually present; the results could be due to ESP or perhaps DMILS. Although the OBEs themselves are not caused by anomalous processes, some OBE reports are indeed alleged to have involved some form of ESP (see Alvarado, 1982, 1997b, 2000; Blackmore, 1982a; Palmer, 1978a). If this turns out to have a normal explanation too, it remains a feature of OBEs that theories of such phenomena must be able to account for.

We will now consider another experimental procedure, designed to facilitate apparitional experiences, which may involve the induction of a HG-like state.

Psychomanteum experiences

In recent years, a number of researchers have been using psychomanteum[7] chambers to try to facilitate reunions between participants and their deceased loved ones (Arcangel, 1997; Hastings et al., 1999; Moody, 1994; Moody with Perry, 1993; Radin & Rebman, 1996; Roll & Braun, 1995). As Moody with Perry (1993, p. 147) noted, "The word *psychomanteum*, taken literally, implies that the spirits of the dead are summoned as a means of divination so that they can be asked questions about the future or other hidden knowledge." However, the purpose of the modern psychomanteum tends to be to facilitate reunions.

Studies have found that from 22% (Roll & Braun, 1995) to more than half of the participants (Hastings et al., 1999; Moody, 1994; Moody with Perry, 1993; Radin & Rebman, 1996), or in one study 85% (Arcangel, 1997), have reported encounters with deceased persons during their time in the psychomanteum or oracle chamber. However, not all encounters occur during the session; some (or additional) encounters are reported later when the participant has returned home (Moody with Perry, 1993).

Prior to a typical psychomanteum session, participants are asked to bring along mementoes which remind them of the particular deceased person that they wish to encounter. A facilitator then talks with the participant about the deceased and then they examine and discuss the mementoes. However, note that the procedure followed in Arcangel's research differs in that there is not so much in-depth preparation of this type. Nevertheless, her participants are still allowed time to ask questions and are invited to discuss their motivation for wanting to participate; in 80% of cases it was to be reunited with departed loved ones. A unique aspect of Arcangel's sessions is that all participants are asked "to approach the method with the intention of acquiring wisdom instead of seeking a reunion with a deceased loved one." (p. 93). Participants are then escorted into the psychomanteum booth, which generally consists of a mirror mounted on a wall in front of a comfortable chair. The booth itself is surrounded by a black curtain or fabric and is lit by a low-voltage light. The mirror and chair are angled so that the participant does not see their own reflection, only a reflection of darkness, as it were. Participants are then asked to relax and gaze into the mirror with the hope that the deceased person will appear within it (but see Arcangel, 1997). When they emerge from the booth, participants are asked to report and reflect upon their experience.

Reunion experiences may range from a sense of presence to seeing vivid and realistic visual images of a deceased person(s) who is either the designated person or some other known or unknown person (or occasionally an animal) (Arcangel, 1997; Hastings et al., 1999; Moody, 1994; Moody with Perry, 1993; Radin & Rebman, 1996; Roll & Braun, 1995). Such experiences can be accompanied by apparent mental or verbal communication, tactile and bodily sensations, sensations of movement and, occasionally, smells. A number of participants report that they feel wide-awake during the experience and they may be convinced that the deceased person(s) was actually present.

There are a number of similarities and differences between psychomanteum experiences and accounts of HG/HP imagery. Quotations from published psychomanteum accounts and from a recent survey of HG/HP experiences (Sherwood, 1999) will be used to illustrate some of these points. This survey was conducted via a questionnaire posted on the world-wide web which was advertised on the Koestler Parapsychology Unit webpages. Four hundred and ninety-two respondents were asked about the content of their HG/HP experiences in a range of different sensory modalities.

The reasons for considering these two types of experience are threefold: firstly, there seems to be an implicit assumption in Moody with Perry's (1993) book 'Reunions: Visionary Encounters With Departed Loved Ones' that participants are actually in a HG state during their psychomanteum experience; secondly, some psychomanteum experiences have been reported after the session when the participant is in either the HG or HP state; thirdly, the circumstances in which psychomanteum and HG/HP imagery are reported are similar in a number of ways.

---

[7] Whilst it is recognised that Arcangel (1997) prefers to use the term 'oracle' rather than 'psychomanteum,' the latter will be used as a generic term in this paper.

In a chapter entitled 'Creating Your Own Psychomanteum,' Moody with Perry (1993, pp. 164-183) provide some guidelines on how to facilitate psychomanteum experiences. Prior to the appearance of any visual imagery, they report that:

> Properly relaxed, your arms will feel very heavy and the tips of your fingers will tingle as though charged slightly with electricity. This tingling feeling almost always signals <u>the beginning of the hypnagogic state</u>. (p. 176, my underlining).

Later they advise against trying to control the imagery once it has begun:

> Attempting to direct images *after* they have begun will usually cause them to fade away. Why this happens I am not sure, but my guess is that conscious thought brings you out of <u>the hypnagogic state of mind where these images occur</u>. (p. 177, my underlining).

These are clear suggestions that the participant is in the HG state, at least when the visual imagery occurs. However, it appears that Moody's position may have changed with regard to links between the psychomanteum and HG experiences; in an earlier publication (Moody, 1992) he seems certain that these two kinds of experience are quite distinct:

> <u>When I began my research with crystal gazing, I assumed that the images were hypnogogic</u>. However, the results reported here would require a considerable expansion and reformulation of the concept of hypnogogia before they could be accommodated within that framework. (p. 119, my underlining).
>
> I have experimented with several altered states of awareness including hypnogogia and lucid dreams and have had hallucinations following surgery. <u>What I experienced [in the psychomanteum], whatever it was, was in no way related to these other experiences</u>. (p. 113, my underlining).

Unfortunately, Moody (Moody with Perry, 1993) does not expand upon these views and state why he has changed his mind.

Another indication that the psychomanteum may induce a HG state (perhaps too successfully) is that in Hastings et al.'s (1999) study, four participants actually fell asleep briefly during their session. One of the surprising findings, that Moody with Perry (1993) noted, is that about a quarter of their psychomanteum participants did not have their encounter until later (usually within 24 hours). Some of these encounters occurred during the naturally-occurring HG or HP states as the following example will illustrate:

> Then I went home. That first night I started having the distinct feeling that someone was around. I would go to sleep, and it was as though I felt someone in the room. I would wake up still feeling that someone had been in there with me, but couldn't figure out who it was.
>
> On the second night I woke up and had a strong sense of the presence of my father in the room. I could tell that he was trying to talk to me, but I couldn't tell what he was saying. After waking up that time I couldn't go back to sleep.
>
> The next night it happened again. This was the third night in a row in which I went to sleep and woke up feeling a presence in the room. This time I woke up and smelled my father's aftershave lotion. (Moody with Perry, 1993, pp. 137-138).

The circumstances in which the psychomanteum and HG/HP experiences occur are also somewhat similar; one is likely to be in a relaxed state in a darkened dimly-lit room which may be relatively quiet and free from distractions and external stimulation. These circumstances share features of the psi-conducive state (Braud & Braud, 1975; Honorton, 1975; Mavromatis, 1987). The similarities between the psychomanteum procedure and the ganzfeld procedure have also been noted (Hastings et al., 1999). In both the psychomanteum and the HG/HP states, one usually has little or no control over the beginning and ending of the experiences, though perhaps this might improve with experience (Kelly & Locke, 1981; Mavromatis, 1987). In both cases an attitude of passive volition seems to be conducive. Attempting direct control, as in some lucid dreams, can lead to termination of the experience (Moody with Perry, 1993, p. 177). In both sets of circumstances, the experiences can be extremely vivid and can be considered to be real or even hyper-real (Mavromatis, 1987, p. 30; Radin & Rebman, 1996, p. 67). Moody reported that he was quite surprised by how many participants thought their experiences were real as opposed to imaginary events.

Individuals also tend to report feeling awake and aware of their surroundings throughout the experience. Interestingly, research has found that one of the features of HG/HP imagery experiences that may lead people into believing them to be real is that they feel awake throughout (McKellar & Simpson, 1954).

> I was completely awake, and this was not a dream, it was very concrete, very here and now. (Moody with Perry, 1993, p. 138).

> I'm aware that I'm not really asleep, yet. I'm aware of the room or surroundings. (hypnagogic imagery).

There may also be some uncertainty concerning the source or the location of the imagery; for example, one may not be sure whether the images are real or imaginary. In psychomanteum experiences one may also not be sure whether the deceased person (and also perhaps one's self) is actually inside or outside the mirror (Moody, 1992). There is also a case of HP imagery involving an apparition that came out of the area of light in which it had first appeared (Purcell, 1997).

> I was sitting in there, and all of a sudden it seemed that these three people stepped right into the room all around me. It looked as if they stepped out of the mirror, but I felt that such a thing couldn't be, so I was shocked. I didn't know what was going on. (Moody with Perry, 1993, p. 135).

> One night I awoke and looking down past the foot of the bed towards the built-in wardrobes I saw a circle of light apparently projected on the doors. The circle grew until it was about three feet in diameter at which point a face appeared in it and began to give a news summary or similar kind of account; I received the distinct impression that this, whatever it was the man was talking about, was merely the preamble to some unknown main business.
>
> After a few moments the talking head announced that "the moment you've been waiting for" had arrived and proceeded to introduce "the penguin". This turned out to be nothing less than a giant (ie. adult-sized) bird which promptly climbed out of the frame on the wall and waddled around the end of the bed on my mother's side. (hypnopompic imagery, Purcell, 1997, p. 54).

Although visual is the most common modality reported during both psychomanteum (Arcangel, 1997; Moody with Perry, 1993) and HG/HP experiences (Foulkes & Vogel, 1965; McKellar & Simpson, 1954), other modalities, such as auditory, olfactory (smell), tactile, kinaesthetic (movement), and bodily sensations are also reported. Psychomanteum (e.g., Arcangel, 1997) and HG/HP experiences (e.g., Leaning, 1925; Mavromatis, 1987) may also both involve more than one modality and these may occur simultaneously. A sense of presence is also quite a common feature of both experiences (Arcangel, 1997; Critchley, 1955; Hastings et al., 1999; Moody with Perry, 1993; Ohayon et al., 1996; Radin & Rebman, 1996). Although a sense of presence is common to both contexts, with the psychomanteum it seems that the presence is more likely to be known and positive whereas with HG/HP senses of presence it is often unknown and can be negative.

> I couldn't see her, but I knew she was there. I could feel the love of her presence. (Moody with Perry, 1993, p. 146).

General awareness of presence/s in room/house with malevolent intent. (hypnagogic imagery).

With regard to visual imagery, psychomanteum and HG/HP experiences are similar in terms of the dynamic nature of the imagery and also in terms of the progression from simple formless to more complex images (Gurney et al., 1886; Leaning, 1925; McKellar, 1989; Mavromatis, 1987; Moody with Perry, 1993; Parco Zuliani, 1986).

> I saw this mist in there, and to tell you the truth, for just a minute I thought you were going to have to call the fire department because it looked like smoke to me. I finally saw it was in the mirror, but just for an instant I thought it was smoke. Then I saw colors all over the mirror, patches of color, and I began to see scenes. Some were of my childhood. They were very realistic. Three-dimensional scenes were all around me. Some of them I recognized as things in my life, but others not. (Moody with Perry, 1993, p. 114).

> Purple & gold nebulae, changing to vivid scenes of people, animals' places in varying historic periods which flash by in a montage. The scenes usually last for only a few seconds to be replaced by the next. Have also seen close-ups of faces, mouths, eyes. These vignettes are extremely detailed and more "real" than life. (hypnagogic imagery).

There is clearly an overlap in terms of content too (Kelly & Locke, 1981). Mavromatis (1987), based on an earlier classification by Leaning (1925), identified six main categories of visual HG/HP imagery: (1) formless; (2) designs; (3) faces, figures, animals, objects; (4) nature scenes; (5) scenes with people; (6) print and writing.

Formless imagery reported during psychomanteum experiences includes changes in illumination levels (Hastings et al., 1999; Radin & Rebman, 1996), clouds, smoke and mist (Moody with Perry, 1993), colours and flashing lights (Hastings et al., 1999), bright flickers, flashing specks, coloured lights and patches of colour (Moody with Perry, 1993). Patterns, shapes and geometric designs have also been reported during psychomanteum experiences (Moody with Perry, 1993) and HG/HP imagery (Gillespie, 1989; Leaning, 1925; Oswald, 1962; Parco Zuliani, 1986).

In terms of Mavromatis's (1987) third category, Moody (1994) reported that 35 of his 50 participants had experienced visionary encounters with deceased loved ones; of these, 25% encountered someone other than the person that they wanted to see. Interestingly, participants often report that the deceased looked different to how they did prior to death; this difference is usually a positive one. Arcangel (1997) also reported that some of her participants reported apparitions of people whom they did not know. In contrast, some of her other participants reported well-known public, historical or religious figures, such as Marilyn Monroe, Alexander the Great and Buddha. Some figure(s) may not be identifiable; they may consist only of an outline or shadow of a human figure (Hastings et al., 1999; Moody, 1992; Radin & Rebman, 1996; Sherwood, 1999) or the figures may be robed or masked or obscured in some other way (Hastings et al., 1999; Sherwood, 1999).

> I felt so joyful. They looked a lot younger than when they died, more as they had in our younger years when we were all good friends. Still, there was a difference. They looked a little different, healthier you might say, or as though they had a lot of energy, a lot of life. (Moody with Perry, 1993, p. 128).

> People (often groups), both known & unknown, mainly females. (those I know aren't quite who they really are, somehow a variation) many times they seem angelic/faery in nature. (hypnagogic imagery).

Although figures are frequently reported, occasionally they may be incomplete or in some cases only isolated body parts, such as a hand or foot or a face, may be seen (Hastings et al., 1999; Moody, 1992). Such images may gradually emerge or progressively develop (Moody with Perry, 1993). Other apparitions can also consist of incomplete human figures, particularly heads and faces (Green & McCreery, 1975/1989).

> I knew someone was there with me, but I had no idea who. Then I saw this shape, a person forming up in the mirror. I could see him a little bit at a time. (Moody with Perry, 1993, p. 115).

> I just saw his head and chest and upper abdomen area. It was not his whole form, but this was just as clear as looking at you. (Moody with Perry, 1993, p. 131).

> Blackness: shadows forming and moving toward me...in the shape of human silhouettes, usually. (hypnagogic imagery).

> Perhaps an upper extremity or hand of a person. (hypnagogic imagery).

Faces of people, who may be living or dead, have been reported during the HG/HP states (Gurney et al., 1886; Leaning, 1925; McKellar, 1957; Mavromatis, 1987; Oswald, 1962); Leaning (1925) pointed out that one noteworthy characteristic of HG faces is that they may appear from mist or smoke or appear within a circle of light (see also Purcell, 1997, example). HG faces may also appear to be talking to you but no sound is heard (Leaning, 1925).

> First I saw her from a long distance away, and it was just her face. Then, as she came closer and closer, she was more ghostly, but not in a haunting way. She was not as bright and not as solid. Plus there was a kind of smokiness around her. (Moody with Perry, 1993, p. 133).

> I saw an array of soft colored twinkles floating around and around. In the center was my grandmother smiling and waving at me. (hypnagogic imagery).

Apparitions of animals have also been reported during psychomanteum (Moody with Perry, 1993; Radin & Rebman, 1996) and HG/HP experiences (Leaning, 1925; Purcell, 1997).

> Then I saw a peacock. It was facing away from me. Then it turned around, and I was overwhelmed by the colors. It turned and spread its feathers out. It was huge!
>
> It seemed to have a human face, although I couldn't see exactly what the face looked like. (Moody with Perry, 1993, p. 154).

> Birds flying very fast back and forth over me. (hypnopompic imagery).

Landscapes and other scenes are common to both types of experience (Hastings et al., 1999; Leaning, 1925; Mavromatis, 1987; Moody, 1992; Moody with Perry, 1993). Images of scenes involving people are also reported in the psychomanteum (Moody, 1992; Moody with Perry, 1993) and HG/HP states (Mavromatis, 1987); these may or may not relate to previous experiences from one's own life.

> Then I saw colors all over the mirror, patches of color, and I began to see scenes. Some were of my childhood. They were very realistic. Three-dimensional scenes were all around me. Some of them I recognized as things in my life, but others not....
>
> There were scenes, too, of places I have never been to or seen. Very pretty places. I don't know where they were or what this was, but I got to thinking that the scenes were all around me on the sides, so I was in the mirror. (Moody with Perry, 1993, p. 114).

> Primarily images of places, whether unknown or familiar ones. (hypnagogic imagery).

> Earlier life experiences. (hypnagogic imagery).

There do not appear to be any published accounts of print or writing appearing during mirror gazing.

Although some form of communication with the deceased is usually reported during psychomanteum sessions, participants often find this difficult to describe and it is not always clear whether it is auditory or mental in nature (Moody with Perry, 1993). Moody estimated that complex communications took place in nearly half of the reported encounters in his sessions. Sometimes these communications can be more one-sided than interactive. It seems that only in a minority of cases (c. 15%) do participants feel that they actually heard what the deceased was saying; more frequently the communication is reported to involve some form of mental telepathy (Moody with Perry, 1993). It is not clear whether the nearby facilitator has ever heard anything during these purportedly auditory encounters.

Common forms of auditory HG/HP imagery include hearing voices speaking and calling one's name (e.g., McKellar & Simpson, 1954; McKellar, 1957; Mavromatis, 1987; Schacter, 1976). However, HG/HP communications appear to be shorter and more one-sided. In addition, HG/HP speech is not always intelligible and may occasionally be nonsensical too (e.g., Isakower, 1938). Another potential difference in auditory imagery is that during the HG/HP states the imagery often includes non-verbal content, such as ringing and bells (Leaning, 1925; Mavromatis, 1987; Oswald, 1962; Schacter, 1976), percussive sounds (Critchley, 1955; Mavromatis, 1987; Mitchell, 1890; Oswald, 1962; Pearce, 1989), music (Leaning, 1925; Schacter, 1976), footsteps, humming and buzzing, transport sounds, and motors and machinery (Sherwood, 1999). These non-verbal images do not seem to be a feature of psychomanteum experiences.

These psychomanteum communications usually involve some kind of reassurance either relating to the well-being of the deceased or the way in which the participant has been coping with the loss and getting on with their life. Answers to problems or questions have also been reported during the HG/HP states (Sherwood, 1999).

> "How are you?" I asked.
>
> Her lips didn't move, but I got a mental communication from her in which she said, "I'm fine and I love you."
>
> I asked her another question: "Was there any pain when you died?"
>
> "None at all," I could hear he say. "The transition to death was easy."
>
> At first I verbalized my questions, just said them right out loud. But before I got a few of the questions out, the answer would come back to me in a mental form. There was no sound of her speaking, I just knew what she was saying. (Moody with Perry, 1993, p. 99).

> I have heard people calling my name and trying very hard to tell me something....I have yet to find out what they are trying to say though because my own fear tends to block it out. (hypnagogic imagery).

In terms of imagery in other sensory modalities, olfactory imagery is rare in both HG/HP (Leaning, 1925; Mavromatis, 1987; Mitchell, 1890) and psychomanteum experiences, although a participant in Hastings et al.'s (1999) study did report the smell of incense and fragrances associated with particular individuals have also been reported (Arcangel, 1997; Moody with Perry, 1993). Sensations of being touched, hugged or held have been reported in the psychomanteum (Arcangel, 1997; Hastings et al., 1999; Moody with Perry, 1993) and during the HG/HP states (Sherwood, 1999). As with HG/HP examples (Sherwood, 1999), the tactile sensations reported during the psychomanteum tend to be passive rather than active. This passivity seems to apply to other apparitions too (Green & McCreery, 1975/1989; Tyrrell, 1943/1973).

> I was so happy to see him that I began to cry. Through the tears I could still see him in the mirror. Then he seemed to get closer and he must have come out of the mirror because the next thing I knew he was holding me and hugging me. (Moody with Perry, 1993, p. 93).

> So I tried to relax, but I could never physically see her. But I felt her! I felt her kiss me on the cheek the way we always did when she was alive. (Moody with Perry, 1993, p. 146).

> Someone kissing my neck. (hypnagogic imagery).

> I can also sense love and someone hugging me...things like that. (hypnagogic imagery).

Bodily sensations of energy flowing through the body or inside the chamber, warmth, tingling hands and bodily jerks have all been reported during the psychomanteum (Arcangel, 1997; Moody with Perry, 1993; Radin & Rebman, 1996) and during the HG/HP states (Leaning, 1925; McKellar, 1957; Oswald, 1959, 1962; Sherwood, 1999). The tingling hands appear to be a feature that participants should expect prior to their psychomanteum experience (Moody with Perry, 1993, p. 176).

> Alternating waves of light and dark, silence and sound, and internal energy waves. (Hastings et al., 1999, participant 37, p. 103).

> There was an intense warmth (physically / spatially) around me. (Hastings et al., 1999, participant 37, p. 103).

> I stayed as relaxed as I could and just looked at her. My hands were tingling, and I could feel my heartbeat pick up speed. (Moody with Perry, 1993, p. 89).

> I felt a kind of jerk or shudder, vertigo, like maybe I was going to get dizzy, but I didn't. (Moody with Perry, 1993, p. 126).

> Something like an electric shock that passes through me very fast. (hypnagogic imagery).

> Incredible heat, extreme cold. (hypnagogic imagery).

> Tingling feeling in arms hands feet, and legs, although not at the same time. (hypnopompic imagery).

> Sometimes my arms and/or legs will involuntarily jerk really forcefully and very seldomly my entire body will jerk. (hypnagogic state).

Participants have also reported sensations of movement, such as moving forward or being drawn backward, walking or gliding, often apparently into or through the mirror (Moody with Perry, 1993). Similar sensations have been reported during the HG/HP states (Sherwood, 1999).

> I moved forward, not with a lurch but smoothly, almost gliding. I went right into the mirror, moved right on through....
>
> All of a sudden I was walking, or felt that I was walking, out onto this platform, and as I did so, they lit up and came toward me, but only so far....
>
> I felt so happy, and I knew they did too. Then suddenly I was drawn backward, and I saw them receding off into the distance again and I felt myself sitting in the chair again. (Moody with Perry, 1993, pp. 126-128).

> Going forward. Or being forced to go forward. (hypnagogic imagery).

> Floating, rising, gliding, sometimes slow other times fast. (hypnagogic imagery).

> Walking, running. (hypnagogic imagery).

The most apparent difference between psychomanteum and HG/HP experiences is that during the psychomanteum the participant presumably has his/her eyes open (Kelly & Locke, 1981) whereas in the majority of HG/HP imagery experiences the participants' eyes are closed (Leaning, 1925; McKellar, 1989; McKellar & Simpson, 1954). Psychomanteum experiences also seem to be much more interactive; during HG/HP experiences one tends to be much more of a spectator. Perhaps this is a reflection of the differing motivation of participants in these differing situations.

Psychomanteum experiences also seem to be more emotional and have more of a profound effect on people than HG/HP experiences. Perhaps this is not surprising given the purpose of the psychomanteum. Nevertheless, HG/HP experiences are often remembered for long periods of time, much more so than dreams. My impression is also that the visual images of faces and figures during the psychomanteum seem to be more stable than similar HG/HP examples.

There is evidence to suggest that both psychomanteum and HG/ HP experiences can be given paranormal interpretations (Hastings et al., 1999; Moody, 1994; Moody with Perry, 1993; Sherwood, 1998). One possible explanation is that the apparitional experiences might be real encounters with deceased persons (e.g., Stevenson, 1982). However, evidence for such an explanation in the context of the psychomanteum seems to be primarily based upon the reports of the participants themselves, which has obvious limitations, especially given the fact that many of them may still be undergoing the grieving process and have a strong desire/need for a reunion with a particular loved one. Arcangel (1997) reported that two of her participants saw unknown apparitions who asked them to pass on a message to a third party who was able to identify the apparition; unfortunately no detail is given about the nature of these messages.

Telepathic explanations have also been proposed, for example by Gurney, Myers or Tyrrell (Gurney et al., 1886; see overview by Irwin, 1999; Tyrrell, 1943/1973). However, these theories are more successful at explaining living and crisis rather than post-mortem apparitions. Post-mortem apparitions could perhaps be explained by "the 'super-ESP' hypothesis, which attributes the phenomena to vast extrasensory powers possessed by persons still alive." (Gauld, 1977, p. 578) but until we are certain if and how ESP operates it is difficult to say whether or not such a 'super' form is plausible. Much of the information communicated in the psychomanteum sessions seems to be quite general and/or is information that the participant is likely to have known already. Useful future research could attempt to obtain specific veridical information that the participant could not have known in an effort to establish the possibility of ESP. One obvious suggestion would be to conduct a psychomanteum study in which participants are asked to gain information about a remote randomly-selected target. This may help to determine whether any genuine anomalous processes, such as ESP, might be involved in psychomanteum experiences.

It has also been suggested that psychomanteum experiences might involve some form of psychokinesis (PK) effect in which the participant's mental state has an effect on their external environment (Radin & Rebman, 1996). In support of this PK explanation, Radin and Rebman (1996) found an almost significant ($p = 0.07$) overall positive correlation between a set of physiological variables associated with the participants and a z-score measure taken from an RNG placed outside of the psychomanteum chamber; in addition one of the seven participants obtained an individually significant positive correlation ($R = 0.288$, $p = 0.036$).

One normal explanation for psychomanteum experiences is that some of them may be cases of HG-like imagery. The content is probably strongly influenced by the context and the needs, motivations and expectations of the participants (which may be linked also to a desire to reward the researcher for the significant amount of time that some researchers invest in their sessions). In the psychomanteum context one is in unfamiliar surroundings facing a mirror and is expecting to gain wisdom or encounter deceased loved ones (which may foster paranormal and supernatural thoughts); in spontaneous HG experiences one is usually in familiar surroundings and may not have any particular expectations other than to fall asleep fairly soon. Research into HG/HP imagery has found that one's thoughts and feelings at a given moment can be translated into visual or auditory imagery (Silberer, 1965, cited in Schacter, 1976; Sherwood, 1999). However, although participants' expectations of encountering a deceased loved one are not deliberately encouraged by the facilitator in Arcangel's sessions, her participants have the highest proportion of encounter experiences, which may seem somewhat contrary to predictions. Nevertheless, although these participants were asked to expect to acquire wisdom rather than a reunion, 80% had admitted that this was their reason for participation. Thus, the potential influence of the participants' mental set and expectations is something that definitely needs to be investigated to see whether it can influence the content of subsequent experiences in a psychomanteum chamber. However, for ethical reasons, such investigations should, perhaps, be conducted with a more neutral purpose in mind. It would be useful to conduct a psychomanteum study whose purpose was to study the experiences and imagery reported but which had no connections whatsoever with contacting deceased loved ones. Certain suggestions or expectations could be induced and the resulting experiences compared with a control group. One could then try to establish whether or not the content of psychomanteum experiences is highly dependent upon the participants' mental set and expectations.

A potentially interesting avenue of research would be to have more than one person sitting in the psychomanteum chamber at a time. This is something that Moody (1992) considers to be important; he was proposing to investigate potential collective apparitions himself but now appears to have changed his mind (Moody with Perry, 1993, p. 153). If both participants saw the same imagery at the same time then this might lend some support to the possible objectivity of the phenomena, though of course both parties could still be influenced by their expectations and possibly by information provided earlier by the facilitator. There might also be potential conformity issues too.

As it is, the similarities between psychomanteum experiences, HG/HP imagery and other forms of imagery, such as ganzfeld (Bertini et al., 1964/1969), sensory deprivation (Bexton, Heron, & Scott, 1954; McKellar, 1957; Reed, 1974), drug-induced (Ardis & McKellar, 1956; Klüver, 1942; Schacter, 1976) and crystal gazing imagery (Leaning, 1925) suggest that, in my opinion, the psychomanteum apparitional experiences are subjective and imaginal rather than objective and in some sense physically present. I think these psychomanteum experiences are more likely to be normal HG/HP-like imagery than actual encounters with deceased persons.

However, perhaps these apparitions are neither completely subjective nor completely objective? Based upon their discovery of an apparent link between environmental and participants' physiological variables monitored during psychomanteum sessions, Radin and Rebman (1996) "postulate that some apparitions—metaphorically speaking—are short-term vortexes caused by disturbances in a three-way equilibrium [between mind, body and environment]. When the disturbed state is allowed to rebalance, the apparition dissolves back to where it came from." (pp. 81-82).

Although there is evidence to suggest that the psychomanteum chamber might induce a HG-like state, and many participants believe that they have had genuine encounters with deceased persons, the evidence for the latter is weak at present and is based upon the subjective reports of individuals who often have strong needs and high expectations of genuine experiences. Tighter, more objective research is needed to try to identify whether any anomalous processes are actually involved.

Chapter summary

A better way of trying to establish evidence for anomalous processes/agencies is to try to induce and/or study then under controlled conditions, such as in a laboratory. There have been relatively few experimental investigations of anomalous experiences during true HG/HP states but many more investigations have attempted to induce, or allow a person to induce, a state that is believed to resemble the naturally-occurring HG state. Attempts have also been made to study anomalous experiences that are reported during sleep, either in the laboratory or in participants' homes. The experiments (or non-experimental induction) involving the HG/HP and sleep states have mainly been concerned with ESP and OBEs. There have also been attempts to induce apparitional experiences using a psychomanteum chamber, which may induce a state resembling the HG state.

A small number of experiments have been conducted to investigate whether the naturally-occurring or self-induced HG/HP states are conducive to ESP. Overall, in my opinion, the evidence suggests that the states are conducive to ESP, perhaps even more so than dreaming, although the effect sizes are small. Unfortunately these studies involve small numbers of participants and/or trials and seem to have been somewhat exploratory. There are problems with the design of some studies too. Much of the ESP research involving ASCs has been conducted using the ganzfeld technique, a procedure that is believed to induce a HG-like state. Some meta-analyses of ganzfeld studies have concluded that they provide good evidence for ESP, albeit with small effect sizes, but others have found or concluded that they do not provide evidence for ESP. The major problem with ganzfeld research as evidence for the psi-conduciveness of the HG state is that it is not clear whether the ganzfeld actually induces an ASC; in addition recent research has suggested that brain activity under ganzfeld conditions does not resemble that during the HG state but is similar to that during relaxed wakefulness.

A number of studies have also been conducted in order to establish whether there is any evidence for dream ESP. The Maimonides dream studies are undoubtedly the most well-known and most successful but attempts to replicate them have not been so successful, which is perhaps the most serious criticism of the Maimonides findings. Nevertheless, a recent met-analysis of the Maimonides dream ESP sessions found the overall hit rate to be 63% (MCE = 50%) with odds against chance of 75 million to one. Some non-Maimonides studies have also obtained significant positive results, although these studies are not without their own problems; many rely upon a few participants and a small number of trials and some studies conducted multiple tests of significance and did not report the results of all analyses. In conclusion, there is experimental; evidence to suggest that the HG/HP and sleep states are conducive to ESP but the effect sizes are small.

There is anecdotal and experimental evidence to suggest that sleep-related states, particularly the HG state, are conducive to OBEs and that the psychophysical conditions in which OBEs and normal HG/HP experiences are reported are similar. OBEs and normal HG/HP experiences are also similar in terms of phenomenology. There are also similarities in aspects of a number of psychological theories of HG imagery and OBEs; for example, it has been argued that these experiences may be the result of transformations of normal sensory input and that this might be accompanied by a shift in attention from external towards internal inputs (which may partly be due to a reduction in sensory input). Nevertheless, even though there is experimental evidence to suggest the conduciveness of the HG/HP and sleep states to OBEs, this does not mean that any anomalous processes are necessarily involved. However, some OBEs are alleged to have involved some form of ESP; this could be due to the psi-conducive nature of the HG/HP and sleep states rather than the OBE.

In recent years, a number of researchers have been using psychomanteum chambers to try to facilitate reunions between participants and their deceased loved ones. This chapter has pointed out the similarities between the features of normal HG/HP experiences and psychomanteum experiences and also the circumstances in which both types of experience are reported. It is possible that the psychomanteum might induce a HG-like state but this has not yet been tested. In addition, there is evidence that some psychomanteum experiences are not reported whilst the participant is in the chamber but they occur later when the participant is in the HG or HP state. It is argued that one possible explanation for psychomanteum experiences is that they are normal HG/HP imagery that has been shaped by the participants' needs and expectations of a real encounter with a deceased loved one.

Chapter 6

WWW versus traditional pencil-and-paper survey administration

In recent years, psychologists have begun to harness the internet and the world-wide web (WWW) as a medium for conducting research both in terms of online experiments and surveys. For those who may be unfamiliar with this new medium, or at least the difference between the internet and the WWW, "The Internet is a global network of computers linked by a standard communications protocol. The World Wide Web (WWW) is a graphical interface to the Internet…" (Clayton & Werking, 1998, p. 545). Information stored on any one computer in the network can potentially be accessed by any other computer elsewhere in the network. Computers whose main purpose is to act as a storage and output facility for WWW files are often referred to as 'web servers'. Other client computers can contact these host computers whose information is then sent to and displayed on the client machines. Special tags, known as 'HyperText Markup Language' (HTML), are usually added to web information files and provide instructions to the client computer regarding how the contents should be displayed. Each host computer has an internet protocol (IP) address. In order to access information stored on a particular computer, the client computer needs to know the IP address (or host domain name) and the directory and name of the information file. This information, along with the type of server that holds the information, is known as the 'Universal Resource Locator' or 'URL'. Computers need software, known as 'web-browsers,' which can contact other computers, request the appropriate files and which can then receive, interpret and display them in the appropriate format (see Nesbary, 2000 for a basic introduction to survey research and the WWW).

With WWW surveys, the questionnaire is displayed on the client computer screen and the respondent answers the questions by typing their responses into text boxes or by using the mouse to point to and click on available responses via radio buttons, checkboxes or pulldown menus. These different ways of recording responses are known as 'controls' and HTML documents that include such controls are known as 'forms' (The World Wide Web Consortium (W3C), 1999). Once the respondent has completed the questionnaire, he or she will be asked to click on a button in order to submit their responses to a Common Gateway Interface (CGI) program located on the host web server. The CGI script will save the data to a file(s) on the server; it can also record details about the submission, can check for missing or invalid data, can perform calculations on the data received and can provide messages or feedback to the sender (Schmidt, 1997; Schmidt, Hoffman, & MacDonald, 1997).

Based upon my review of the relevant literature, I have attempted to summarise the main advantages and disadvantages of using the WWW as a medium for survey research (see Table 3).

Table 3 Possible advantages and disadvantages of WWW surveys

Advantages	Disadvantages
Access to a large population of potential respondents and it may be easier to recruit participants from special groups. Data may be more representative than university students.	Difficult to determine the exact nature of the WWW population. WWW samples are unlikely to be representative of the general population.
WWW surveys allow savings in terms of research costs, e.g., time and money.	Respondents require appropriate hardware/software access and knowledge of how to use it.
WWW surveys can be more dynamic, can utilise multimedia technology and can be tailored to specific respondents.	There may be little or no control over who participates. Self-selected participants may have different motivations and may be more proactive.
Electronic storage of the data minimises data entry by the researcher and can facilitate later analysis.	The researcher has no control over the testing environment or the participants' mental set.
WWW surveys can provide greater reassurances concerning anonymity.	Participants' responses might be affected by computer anxiety.
WWW surveys can enable more complete sets of responses and respondents can be alerted to missing and/or invalid data.	Participants may be responsible for the costs associated with online participation.
Fast administration and return of data	There are possible data security risks and there may be multiple submissions.
	It may be difficult to determine the response rate

In terms of surveys and psychometric tests, there have been understandable concerns raised about the reliability and validity of computerised versions compared with more traditional pencil-and-paper versions. Specifically, it seems to me that there are three main areas of concern: (1) participants and sampling, (2) technology and the testing environment, (3) data integrity and security.

1. Participants and sampling

Although the WWW provides access to a large population of potential respondents and facilitates the targeting of special groups (Reips, 1999; Schmidt, 1997), the constantly expanding number of users makes it difficult to determine the typical characteristics of the WWW user population. This makes it difficult to establish the extent to which WWW users are typical, and therefore representative, of the general population and there are likely to be generalisability problems associated with WWW samples (Pasveer & Ellard, 1998; Smith & Leigh, 1997). Clearly, any WWW survey will exclude people who do not have access to it or do not know how to use it.

It has been estimated that two-thirds of WWW users are male and that they tend to be white, in their late teens to early thirties with above-average education and socioeconomic status, and tend to be in educational, professional or managerial contexts (Buchanan & Smith, 1999; The GVU Center, 1998; Schmidt, 1997; Stanton, 1998). However, this profile is changing and more people, particularly women, are starting to use the Internet (Pasveer & Ellard, 1998). On the other hand, although WWW samples may not be representative of the general population (Pasveer & Ellard, 1998; Ramos, Sedivi, & Sweet, 1998; Reips, 1999; Schmidt, 1997; Stanton, 1998), it has been argued that they may be more heterogeneous and possibly more representative (Buchanan & Smith, 1999) than samples of university (typically psychology) students that are often used in psychological research.

Another issue to consider is participant recruitment and motivation. Web questionnaires can be classified into three types: open, closed and hidden (Bradley, 1999). Open questionnaires are open to any visitor; closed questionnaires are only open to those who have been invited to participate and participation is likely to be password-protected; hidden questionnaires may only appear to a visitor when certain criteria have been met. Open and closed samples have also been referred to as unrestricted and recruited samples, respectively (Watt, 1997). Although it is possible to determine a sampling frame and to control access to a WWW survey, many studies are open to any visitors. One reason for avoiding access controls is that it may affect the candour of participants' responses (Stanton, 1998). With open access it is possible that participants may have been actively seeking out information relating to the survey area and/or they may have a particular desire to participate in research (Buchanan & Smith, 1999), whereas in more traditional pencil-and-paper postal surveys potential participants are often determined by the researcher and participants are more passive in that materials are sent out to them without their prior knowledge. However, there is a middle ground where participants in pencil-and-paper surveys can actively volunteer by responding to recruitment advertisements for example.

There are a number of different ways of advertising WWW surveys and the choice of method(s) will influence the sampling. For example, the URL for a WWW survey can be registered with a number of WWW search engines, which are tools for locating information (Pasveer & Ellard, 1998; Pettit, 1999; Pitkow & Recker, 1995; Schmidt, 1997). Details of the study and its location can also be e-mailed to a known sampling frame or to online mailing lists or newsgroups (Bradley, 1999; Buchanan & Smith, 1999; Pasveer & Ellard, 1998; Schillewaert, Langerak, & Duhamel, 1998; Schmidt, 1997) or hypertext links to the survey can be placed on other WWW sites that potential participants might visit (Bradley, 1999; Pasveer & Ellard, 1998; Schillewaert et al., 1998). Davis (1999), Schillewaert et al. (1998), and Watt (1997) have also noted that participants can be recruited via traditional methods, such as personal, telephone or postal invitation, newspaper and magazine advertisements, or posters .

Stanton (1998) has argued that participants' perception of the anonymity of their responses may affect their motivation to participate in a survey and also the honesty of their responses, particularly if the survey asks questions of a sensitive and personal nature. The self-selected participation involved with many WWW surveys may increase participants' confidence in the anonymity of their responses. With postal pencil-and-paper surveys, the researcher may know who questionnaires have been sent out to and participants' confidence in the anonymity of their responses may be reduced. In support of this potential advantage of computerised surveys, it has been suggested that computers facilitate self-disclosure (Davis, 1999) and there is evidence that respondents are likely to be more candid (see Ramos et al., 1998). This seems a possibility; I noticed that the WWW participants in my survey provided many more additional written comments than the non-WWW participants, though it is not possible to tell whether this is due to the administration method or the differences in the samples. There is also evidence to suggest that the greater the assurances of anonymity, the lower the social desirability bias (see Lautenschlager & Flaherty, 1990) and the lesser the effects of demand characteristics (see Hewson et al., 1996). So, in summary, the greater potential anonymity of open WWW questionnaires may increase participants' motivation and self-disclosure and may also reduce possible response biases.

Research has also shown that administration modes can interact with individual differences, such as computer anxiety (see Brosnan, 1999; Tseng, Tiplady, MacLeod, & Wright, 1998; Webster & Compeau, 1996). What this means is that individual characteristics may mean that some people may perform or answer differently according to how the assessment is administered. It has been estimated that 25-35% of the population suffer from computer anxiety (Brosnan & Davidson, 1994) and that these people will underperform, or at least perform differently, when asked to complete computerised tasks. However, computer anxiety is likely to be less of an issue for WWW surveys involving self-selected participants because participants who are computer-anxious are unlikely to use the WWW and/or volunteer to participate in an online survey (Davis, 1999), though this is still a sample-biasing factor. Whether or not the computer format is compulsory or optional, and what is being assessed, is also likely to influence the effects of computer anxiety. For example, research has found that computer anxiety can affect the results of computer-based (but this was non-WWW-based) assessments of cognitive function and mood (Tseng et al., 1998) but computerised assessments of attitudes and personality have been found to be generally equivalent to pencil-and-paper versions provided that they are not speeded and that they involve some kind of forced-choice response (Bartram & Bayliss, 1984; King & Miles, 1995). One reason why cognitive tests may be affected by computer anxiety may be that worrying uses up some of the participant's available cognitive resources (Brosnan, 1999).

In summary, WWW samples are unrepresentative of the general population, which leads to generalisability problems, but they may be more heterogeneous and probably more representative than samples of university students. Participants in WWW surveys can be recruited by the researcher via traditional and electronic means but in many cases the participants are self-selected and may have found the survey by accident or by searching for information on the survey topic. Surveys with self-selected participants may provide added reassurance regarding anonymity and this might increase participant motivation as well as self-disclosure. There is evidence to suggest that computer anxiety can affect performance on certain computerised assessments, particularly speeded cognitive measures, but the effects are likely to be less of a concern when participants are self-selected. However, a sample of non-computer-anxious participants is atypical of the general population.

2. Technology and the testing environment

Although a computer with internet access is necessary for participation in a WWW survey, it is not necessarily sufficient. The hardware and software capabilities and the speed of the Internet connection will determine whether the survey can be accessed and how quickly the information can be transferred to the client computer (Bradley, 1999; Buchanan & Smith, 1999; Reips, 1999; Schmidt, 1997). Although WWW surveys can have an advantage over pencil-and-paper versions in that they can be more dynamic, can utilise multimedia capabilities (Schmidt, 1997) and can be tailored to specific individuals, this is only beneficial if the respondent's computer has the required specification and has a relatively fast connection; multimedia files can be large and can take a long time to download with a slow connection. If a survey takes too long to download a person may become impatient and decide not to participate or, if they have to pay for the time they are connected to the internet, they may decide that it's not worth the costs involved (Buchanan & Smith, 1999). Thus, one must be careful when designing WWW surveys; creating state-of-the-art WWW surveys that utilise the latest developments may restrict one's population even further.

Computer rather than human administration has the disadvantage that the researcher has less control over the testing environment and the participants' mental set (Buchanan & Smith, 1999; Davis, 1999; Reips, 1999; Stanton, 1998). With a WWW survey, the participant can effectively decide if, when and where they wish to participate and there might be no contact with anyone involved with the research. The researcher also has no knowledge of the state of the participant or their environment at the time the survey was completed but it is assumed that he or she is in an 'acceptable' environment. Some participants may be in a quiet room at home but others may be in a noisier environment, such as an office or a computer lab (Reips, 1996). The variable state of the participants could lead to missing data and/or response biases. However, this same criticism could be applied to more traditional postal surveys too. One study by Davis (1999) found no significant differences between the mean scores on the Ruminative Responses Scale as a function of whether the WWW survey was completed at home, at a campus computing site, or at an alternative campus computing facility.

In summary, the technological requirements will restrict the population that can be sampled using a WWW survey and also therefore the extent to which the results can be generalised. Although with WWW administration of a questionnaire the researcher has less control over the testing environment and participants' mental set than if the researcher had administered it in a laboratory context, I would argue that there is not much difference in the amount of control over WWW and postal administration of questionnaires.

3. Data integrity and security

Completeness of responses and missing data are always a problem with surveys. One of the potential advantages of WWW surveys is that they can be set up to check for missing data and/or invalid responses and the respondent can then be alerted to this fact. Checks can be made by the server's CGI program that deals with the data submitted by the client computer (Schmidt, 1997; Schmidt et al., 1997; Ramos et al., 1998). Indeed research has shown that WWW data may contain fewer missing values than paper-and-pencil data (Stanton, 1998).

In terms of who is allowed to participate in a survey, the researcher can restrict access, if desired, either by only allowing or denying access to computers with particular identifying IP addresses and/or domain names or by requiring entry of a password (Schmidt et al., 1997).

Data security and confidentiality is also an issue with WWW surveys. Because of the design of the internet, it's possible that information sent from one computer to another can be intercepted; confidentiality cannot be guaranteed unless the information is encrypted in some way before it is sent. Once the information has reached the server, steps to protect the data and ensure confidentiality can be taken, such as periodically removing data received from the server and making sure that the file permissions do not allow others to change the questionnaire file or the data files. One potential threat to data integrity is that a malicious person could derive their own WWW questionnaire that is designed to send data to your CGI program. Although, this is (hopefully) unlikely, one can guard against this by designing a CGI program that checks the origin of the HTML document that the client computer is displaying, i.e., it checks whether the data is from the original survey or not (Schmidt, 1997).

Another potential difficulty with WWW surveys is making sure that the data received are from different individuals; checks can be made of the WWW data collected in order to try to identify and remove multiple submissions from the same individual(s). Multiple submissions are quite common with WWW surveys (Pasveer & Ellard, 1998) but are usually accidental or a result of the participants' uncertainty as to whether their data has been delivered or perhaps an expectation that they ought to have received some form of feedback. The latter uncertainties can be reassured by writing a CGI script that sends a message back to the participant acknowledging receipt of their responses, and perhaps providing some form of feedback, once their data has been stored on the server. One way of avoiding the problem of multiple submissions is to write a CGI script that will not accept multiple responses from the same computer (Schmidt, 1997). However, a person who was determined to bias the results could, in theory, do so by submitting multiple responses from different locations and different computers; this would be more difficult to detect. The problem of multiple submissions is not unique to WWW surveys though; postal surveys could also be susceptible to multiple submissions, though if they are hand-written, multiple submissions might be easier to detect in some instances.

Other steps can be taken with WWW surveys to try to detect and remove multiple responses. For example, although it is hidden to the participant, web server CGI scripts can be set up so that they record information about the data submission and the computer from which it was sent, such as the time and the IP address and domain name of the computer, the type of WWW browser being used and also the URL of the WWW page from which the data was sent (Schmidt et al., 1997). This method of detecting potentially invalid responses has been used successfully by Smith and Leigh (1997). The researcher has an ethical responsibility to point out to potential participants that such information will also be recorded. Although mentioning that such information will be recorded may act as a deterrent against deliberate attempts to bias the results, it may also raise concerns about the anonymity of responses. However, although the computer will not be anonymous in such circumstances, the anonymity of the participant can still be maintained, though the researcher could, in theory, identify a person if he or she knew where a particular computer was located and that there was only a single user of that machine.

Tests of the equivalence of WWW versus pencil-and-paper questionnaires

Because WWW surveys are a relatively new form of research, there have been relatively few published studies of the equivalence of WWW versus more traditional pencil-and-paper administration methods.

For measures with different modes of administration to be considered equivalent, there should be equal mean scores, similar distributions of scores, the measures should correlate with other variables to a similar extent, measures should consist of the same number of factors, items should load on the same factors, and the factors should account for similar proportions of variance (APA, 1986; Buchanan & Smith, 1999).

Stanton (1998) compared WWW versus pencil-and-paper versions of an employee survey designed to explore the determinants of perceptions of fairness in their day-to-day interactions with their supervisors. Stanton (1998) confirmed that the factor structure of the scale items did not differ across the two versions and that correlations among subscales were also the same. In addition, the WWW data contained significantly fewer missing data points and there was comparability in terms of item variability. However, Stanton (1998) also found that pencil-and-paper respondents scored higher on two of the scales though he concluded that this reflected the greater heterogeneity of WWW respondents but did not specify the nature of this.

Pasveer and Ellard (1998) compared WWW versus pencil-and-paper versions of a measure of self-trust and found that the psychometric properties were comparable (e.g., factor structure, internal consistency and mean scores), although the variance of the scores was larger in the WWW samples (again this was put down to the greater heterogeneity of the WWW respondents, e.g., in terms of age).

Buchanan and Smith (1999) also compared WWW versus pencil-and-paper versions of a measure of self-monitoring and found that the internal consistencies were equivalent and that the hypothesised factor structure was confirmed with both versions (in fact the WWW version provided a better fit to the model) and there was no significant difference between the mean scores.

Davis (1999) compared a student sample that completed a WWW-based measure of the tendency to respond to sadness or depression with self-rumination with three other student samples that completed a pencil-and-paper version. The WWW sample scored significantly higher than two of the three pencil-and-paper groups but Davis (1999) argued that this could be due to the fact that the WWW sample were more willing to disclose personal information. Davis (1999) argued that these differences were unlikely to be due to the effects of computer anxiety in the WWW sample because the participants volunteered to take part in the study and would be unlikely to do so if they were computer–anxious. In support of the use of

WWW questionnaires, there were no differences in the internal consistency measures for the different groups.

In conclusion, the results of the studies to date that have compared WWW versus pencil-and-paper versions of questionnaires have found that the psychometric properties are generally comparable. There is some indication that WWW sample data may be more variable but this may simply be due to their greater heterogeneity compared with student samples. Although one must always be cautious about the equivalence of different forms of questionnaires, particularly if they are used for decision-making and/or have implications for the respondents, the available evidence suggests that WWW-based questionnaires are as reliable and valid as their pencil-and-paper counterparts. Generalisability may be more problematic, particularly with self-selected participants, but might be more likely than results obtained from student samples. Thus, WWW surveys seem to be a viable alternative to pencil-and-paper surveys, in some contexts, and also possess many additional benefits.

Chapter summary

This chapter has introduced WWW surveys and has outlined some of their potential advantages and disadvantages. It has also discussed three of the main areas of concern with regard to the reliability and validity of WWW surveys: participants and sampling, technology and the testing environment, and data integrity and security. A review of recent studies that have compared WWW with traditional pencil-and-paper versions of questionnaires has established that they generally appear to be comparable; the greater variability of WWW scores in some cases is likely to be due to differences in the samples rather than the administration methods.

Chapter 7 will describe the methodology and results of two identical WWW surveys conducted to look for and confirm relationships between childhood fantasy proneness, childhood sleep-related experiences, and measures of anomalous experiences and beliefs. The second WWW survey was conducted in order to check the reliability of the WWW as a medium for collecting data on these variables. Chapter 10 will describe the methodology and results of a non-WWW version of the survey which was conducted in order to try to cross-validate the SEM findings from the WWW data and to see if the results differed according to the administration and completion method.

Chapter 7

WWW surveys of the relationship between childhood fantasy proneness, childhood hypnagogic/hypnopompic experiences, sleep experiences and anomalous experiences and beliefs

The purpose of these world-wide web (WWW) surveys was to investigate possible relationships between the incidence of childhood fantasy proneness and childhood hypnagogic/hypnopompic and sleep experiences, and the incidence of anomalous experiences and beliefs.

The first WWW survey was exploratory and no explicit predictions were made about the patterns and directions of any relationships; the second WWW survey attempted to replicate and confirm the findings from the first survey, especially given the concerns that have been raised regarding the reliability and validity of WWW survey data. It was hoped that these surveys would provide support for aspects of the proposed models.

Method

Design

These surveys used a computer-presented questionnaire that was made available to users of the world-wide web (WWW) computer network. The same questionnaire was used in both surveys (see Appendix 1). The surveys used a correlational design to investigate relationships among the following variables: childhood fantasy proneness, childhood sleep-related experiences, anomalous experiences, anomalous beliefs, and social desirability.

Pilot study

Twenty participants, who were members of the Koestler Parapsychology Unit (KPU) or friends of the author, were asked to complete an earlier paper version of the questionnaire and to provide feedback on any difficulties or misunderstandings experienced during this task. In the pilot version, participants were asked to give adulthood as well as childhood responses to the sleep-related items in Section A. The adulthood response requirement was removed from the final version because of adverse comments received concerning the length of time and the effort required. This omission did not affect the study aims.

The author also checked the feedback comments from the first twenty WWW participants to ensure that there were no technical difficulties associated with completion of the survey.

Participants

Participants were recruited via the KPU webpages (http://moebius.psy.ed.ac.uk). The location of the survey was not actively registered with any internet search engines nor were any hypertext links with other sites made, as far as the author is aware. Although this would limit possible participation to a restricted WWW population, one of the benefits of this method of recruitment was that visitors to the site would probably have some interest or familiarity with the subject matter and would hold a range of views about it.

Participants were entirely self-selected and there were no access controls employed. Unfortunately, the lack of a known sampling frame makes it impossible to determine the response rate. Visitors to the KPU homepage were able to visit a section entitled 'Experiments.' Visitors could then follow a hypertext link to the 'Survey of childhood and adulthood sleeping and waking experiences.' Those who followed this link were sent a copy of the questionnaire (see Appendix 1) which was then displayed on their computer screen. Those who wished to do so could go through and complete the questionnaire and submit their responses back to the KPU server.

WWW survey 1

One hundred and thirty-one sets of responses were collected between 14th September and 30th November 1996. Twenty-three sets of responses were excluded: participants who were less than 18 years of age (12 cases); participants who had submitted their responses more than once (7 cases); and cases where there was a problem with the responses received (4 cases) e.g., if they were mostly or completely blank. Thus, only 108 of the 131 sets of data collected were analysed.

There were 37 male and 69 female (2 unspecified) participants aged 18-71 years (mean = 30.26, S.D.= 11.36). Sixty-four per cent of the participants were American, 5% Canadian, 2% Mexican, 15% British, 7% other European, 5% other non-European and 2% were of an unspecified nationality. Sixty-eight per cent of the participants had practised or were practising some form of mental discipline, exercise or self-improvement program. Participants were presumably computer-literate to some extent and were also interested in parapsychology since they had visited a web-site about parapsychology.

WWW survey 2

One hundred and forty-seven sets of responses were collected between 7th December 1996 and 29th March 1997. Seventeen sets of responses were excluded: participants who were less than 18 years of age (8 cases), participants who had submitted their responses more than once (3 cases), and cases where there was a problem with the responses received (6 cases). Thus, only 130 of the 147 sets of data were subsequently analysed.

There were 45 male and 83 female (2 unspecified) participants aged 18-68 years (mean = 30.92, S.D.= 10.42). Sixty-five per cent of the participants were of American nationality, 5% Canadian, 12% British, 11% other European, 6% other non-European and 1% were of an unspecified nationality. Sixty-one per cent of the participants had practised or were practising some form of mental discipline, exercise or self-improvement program.

Apparatus

The computer acting as the web server is running under a Linux operating system. The questionnaire was written in HyperText Markup Language (HTML) and used various 'forms' (e.g. radio buttons, text areas) to collect the responses. Submitted results from the clients' computers were handled and saved to a results file by a Perl CGI script (based on a version written by Meng Weng Wong).

Security measures

In order to help maintain the anonymity of responses, the IP address, domain name and time/date of submission were saved to a file that was separated from the file containing the participants' responses. This submission information was also removed from the server at weekly intervals; this meant that anyone who might have been able to gain unauthorised access to the responses file could not necessarily gain access to information that might help to identify the respondents. The results file was also copied at periodic intervals of 4-5 weeks. File permissions on the server were also set up to minimise the risk of unauthorised access to the questionnaire and data files. Participants were informed that their IP address would be recorded and that it might act as a crude indicator of possible attempts to bias the results of the survey via multiple submissions. Participants were also informed that the data transmission method was not secure and that there was a risk that a suitably skilled and motivated person could potentially intercept the information during transit.

To help minimise the potential bias of multiple submissions, the file containing the submission information was checked at the end of each survey. The IP addresses were placed in numerical order and then checked for identical or similar addresses. If identical IP addresses were detected then the responses associated with those addresses were checked; identical or almost identical sets of responses were excluded. Similar checks and exclusions were also made for sets of responses that had IP addresses that began with the same two or three blocks of numbers. As can be seen from the 'Participants' section of this chapter, the number of multiple submissions was small so there were no immediately obvious attempts to bias the results.

Survey questions

Section A Childhood sleep-related experiences.

Section A was concerned with childhood experiences that can occur just before, during or just after a period of sleep. There were 30 main items. Participants were asked to estimate the number of times that each experience had occurred during their childhood on a 5-point scale: No, Once, 2-10 times, 11-20 times, More than 20 times. This ordinal scale was chosen because I felt that it might help to minimise the potential unreliability of participants' responses. All participants' responses are likely to contain some error due to the potential inaccuracy of memory for events that took place a long time ago. It was felt that asking participants to select from a number of fairly specific alternatives might be more accurate, overall, than asking them to estimate the exact number of times they had had the experience. Vaguer scale items , such as 'Often', 'Frequently', 'Occasionally' were avoided because these words may mean different things to different people.

Items relating to the following sleep-related experiences were presented in the survey: 1) hypnagogic imagery, 2) pre-dormital sleep paralysis, 3) exploding head syndrome, 4) hypnopompic imagery, 5) post-dormital sleep paralysis, 6) dream recall, 7) dream control 1, 8) dream control 2, 9) dream vividness, 10) flying dreams, 11) falling dreams, 12) pre-lucid dreams, 13) lucid dreams, 14) false awakenings - type 1, 15) false awakenings - type 2, 16) excessive sleepiness, 17) cataplexy, 18) confusional arousal, 19) sleepwalking, 20) sleep terrors, 21) rhythmic movement disorder, 22) sleep starts, 23) sleep talking, 24) nocturnal leg cramps, 25) nightmares, 26) REM sleep behaviour disorder, 27) sleep bruxism, 28) sleep enuresis, 29) primary snoring, 30) sleep choking syndrome.

Symptoms of the classified sleep disorders were based on the descriptions given in the International Classification of Sleep Disorders (ICSD) (ASDA, 1990). The dream items were based on those used by Palmer (1979), Blackmore (1983) and on descriptions given by

Green and McCreery (1994). The cataplexy and excessive sleepiness items were based on those used by Goode (1962).

Section B Childhood fantasy proneness

The scale used was based on Myers's (1983) Children's Form (ICMIC) and the original version of the Wilson-Barber Inventory of Childhood Memories and Imaginings (ICMI). The scale used in this survey employed the wording used in the children's version as much as possible as it was considered to be better than the original. Only items that referred to the past were selected and items relating to sleep and paranormal experiences were excluded. The item asking about dancing classes was also excluded since the author believed that there might be a gender response bias. Items worded "When I was younger" were changed to "When I was a child" since the scale was to be completed by adults. Participants were asked to give a dichotomous response of either 'True' or 'False' to each of the 15 remaining items. The overall childhood fantasy proneness score was calculated as the total number of 'True' responses and could range from a minimum of 0 to a maximum of 15.

The alpha coefficient of reliability for surveys 1 and 2 was $r = 0.77$ and $r = 0.75$, respectively. Kline (1993) considers the alpha coefficient to be the best index of internal consistency for psychometric scales and recommends that it should be between 0.7-0.9.

Section C Anomalous experiences

Participants were asked to estimate the number of times that each experience had occurred during their childhood and adulthood on a 5-point scale: No, Once, 2-10 times, 11-20 times, More than 20 times. The items covered 4 main areas: extrasensory perception (ESP), psychokinesis (PK), survival of bodily death, and extra-terrestrial life. There were 21 items covering the following experiences: 1) dream ESP, 2) waking ESP, 3) psychokinesis, 4) healing others, 5) being healed, 6) apparition/presence, 7) unexplained noises, 8) unexplained bites, scratches, pinches, 9) communication with the dead, 10) out-of-body experience (OBE), 11) near-death experience (NDE), 12) memories of previous life, 13) spiritual, transcendental, mystical experience, 14) déjà vu, 15) seeing auras, 16) seeing with eyes closed, 17) autoscopic phenomenon, 18) seeing strange lights/objects in the sky, 19) seeing an unidentified flying object (UFO) at close range, 20) contact with the occupants of a UFO, 21) having been on board a UFO.

Most of the items were based on those used by Palmer (1979); items on healing were based on Irwin (1985b); items on seeing auras and seeing with eyes closed were based on Alvarado and Zingrone (1994); items on NDEs were based on Ring's (1980) core experience features; items on unexplained noises/bites/scratches/pinches were based on information on poltergeists from Irwin (1994a); the autoscopic phenomenon item was based on a definition by Dening and Berrios (1994); UFO items were based on types of experiences categorised by Spanos et al. (1993). The anomalous experience scale scores, for childhood and adulthood respectively, were calculated as the mean incidence of experiences for the two time periods and could therefore range from a minimum of 1 to a maximum of 5.

The alpha coefficient of reliability for the childhood anomalous experiences scale for surveys 1 and 2 was r = 0.85 and r = 0.89, respectively. The alpha coefficient of reliability for the adulthood anomalous experiences scale for surveys 1 and 2 was r = 0.90 and r = 0.89, respectively.

Section D Anomalous beliefs and social desirability

The anomalous beliefs scale was based on the 18-item Australian Sheep-Goat Scale (Forced-choice format) (Thalbourne, 1995). Seven items from this scale were used together with 13 additional items that covered similar experiences/processes covered in the anomalous experience scale. The ASGS 3-point scale ('True', 'Uncertain', 'False') and scoring system (2, 1, 0) were used. The anomalous belief scale score was calculated as the mean of the scored responses for the items and could range from a minimum of 0 to a maximum of 2. The alpha coefficient of reliability for the anomalous belief scale for surveys 1 and 2 was r = 0.92.

The shortened version MC-1(10) of the Marlowe-Crowne Social Desirability scale published by Strahan and Gerbasi (1972) was randomly interspersed amongst the anomalous belief items. The reason for its inclusion was to check if there was a significant positive relationship between socially desirable response tendencies and scores on any of the other scales. The MC-1(10) scale has 10 items (5 positive, 5 negative). In order to preserve continuity, these items were answered on a 3-point scale in the same way as the anomalous belief items rather than dichotomously. However, the social desirability scale was still scored in the manner used by Strahan and Gerbasi (1972), i.e., total number of definite responses in the socially desirable direction, minimum 0 to 10 maximum.

The alpha coefficient of reliability for the social desirability scale for surveys 1 and 2 was $r = 0.63$ and $r = 0.61$, respectively. These values are just below the minimum criterion value which is considered to be 0.7 (Kline, 1993).

Section E Personal details and feedback

In this section participants were asked to type in some personal details, such as their age, gender, and nationality, and to give feedback about the survey.

Procedure

Participants recorded their responses on the various scales by moving the on-screen pointer to the appropriate position and pressing the button on their mouse to select it. Other responses were entered by typing the information into the appropriate textboxes provided. At the end, participants were provided with an on-screen button (labelled "PLEASE PRESS HERE TO SEND IN YOUR COMPLETED RESPONSES") which sent the data to, and stored it on the Koestler web server. Once it had been stored, each participant received an on-screen message indicating that their responses had been recorded and indicating that they had the right to withdraw their data at any time should they wish to do so.

Results for WWW surveys 1 and 2

For both surveys, alpha coefficients of reliability were calculated using SPSS for Windows 6.0 and 95, respectively. Descriptive statistics were calculated using Systat for Windows 5.04 in survey 1 and SPSS for Windows in survey 2. Critical values for determining the significance level of the Spearman correlations for survey 1 were calculated by hand using a formula for conversion to *z*-scores (see Siegel & Castellan, 1988); for survey 2 the significant levels were provided by SPSS for Windows 95.

This survey resulted in the calculation of a high number of Spearman correlation coefficients. The problem with multiple testing is that if the same alpha level is used per test and a large number of tests are conducted then the overall likelihood of a Type I error (i.e., rejecting a null hypothesis when it is true) will increase. With an $\alpha = 0.05$ per test we would expect at least one in every twenty correlation coefficients to be spuriously significant. To try to adjust for the multiple testing problem, and to help minimise the overall error rate for the study, a corrected alpha level per comparison (and corresponding criterion value for the correlation coefficient) was calculated for *each survey* for *each table of correlations* using the Bonferroni adjustment technique. Thus, the original alpha level for comparison (0.05) was divided by the number of correlation coefficients in a given table in order to give an adjusted criterion probability value. This probability value was then divided by two for survey 1 (because of non-directional hypotheses), the corresponding value of z was obtained from statistical tables (Clark-Carter, 1997) and this was then used to calculate the adjusted criterion value for Spearman's rho using the equation $z = r_s$ (square root of n-1) (see Clark-Carter, 1997, p. 521).

Note that the significance values in Tables 3-10 are *unadjusted* and use $p = 0.05$ per comparison. The adjusted criterion value for Spearman's rho for Tables 6-7, 9-10, 12-13 are as follows:

Table 6	0.05/150 = 0.000333	$z = 3.60$ for $p = 0.00032$, two-tailed, $r_s = 0.348$
Table 7	0.05/150 = 0.000333	z = 3.41 for p = 0.00032, one-tailed, rs = 0.300

Table 9	0.05/10 = 0.005	z = 2.81 for p = 0.005, two-tailed,	rs = 0.272
Table 10	0.05/10 = 0.005	z = 2.58 for p = 0.0049, one-tailed,	rs = 0.227
Table 12	0.05/435 = 0.0001149	z = 3.87 for p = 0.0001, two-tailed,	rs = 0.374
Table 13	0.05/435 = 0.0001149	z = 3.69 for p = 0.00011, one-tailed,	rs = 0.325

Childhood hypnagogic/hypnopompic and sleep experiences

Table 4 shows that the incidence of the childhood HG experiences (i.e. imagery, exploding head symptoms, pre-dormital sleep paralysis) reported in survey 2 was only 1.0-2.5% less than in survey 1; the incidence of hypnopompic imagery and post-dormital sleep paralysis was approximately 7-8% lower than in survey 1. Table 4 also shows that, in both surveys, hypnagogic imagery was reported more frequently than either hypnopompic imagery or exploding head symptoms. Table 4 also shows that, in survey 1, post-dormital sleep paralysis was reported slightly more frequently than pre-dormital sleep paralysis but in survey 2 the reverse was true.

The incidences of the majority of the childhood sleep and dream experiences reported in survey 2 were within 1-6% of the incidences from the previous survey. However, the difference between the samples was greater in some cases, e.g., symptoms of sleep terrors (65.7% vs. 80.0%), REM sleep behaviour disorder (54.6% vs. 44.4%), rhythmic movement disorder (29.6% vs. 36.9%), excessive sleepiness (41.7% vs. 30.8%), cataplexy (38.9% vs. 30.0%). Table 4 also shows that, in both surveys, dreams, particularly vivid ones, were some of the most frequently reported childhood sleep experiences. Dreams of flying and falling, pre-lucid and lucid dreams and dream control were reported by more than two-thirds of the participants. Type 1 false awakenings were also reported by more than two-thirds of the participants though type 2 episodes involving a tense atmosphere and feelings of foreboding were reported by just under half. At least one frightening dream, which had awakened the sleeper (which may be suggestive of a nightmare), was reported by almost all of the participants; sudden awakenings from sleep accompanied by a vocal outburst (which may be suggestive of a sleep terror) were reported by 65-80% of the participants.

Of the remaining possible symptoms of childhood sleep disorders, at least one episode of sleep talking, confusional arousals or sleep starts was reported by more than three-quarters of the participants.

Table 4 Descriptive statistics for the childhood incidence of the various hypnagogic and hypnopompic and sleep experiences for WWW surveys 1 and 2

Variable	% at least one experience		Mean[a] Response		SD	
	WWW1	WWW2	WWW1	WWW2	WWW1	WWW2
Hypnagogic imagery	76.9	75.4	3.58	3.45	1.63	1.59
Hypnopompic imagery	67.6	60.8	2.92	2.68	1.54	1.57
Exploding head symptoms	50.0	47.7	2.49	2.42	1.62	1.64
Pre-dormital sleep paralysis	46.3	45.4	2.16	2.17	1.45	1.49
Post-dormital sleep paralysis	49.1	40.8	2.25	2.11	1.47	1.45
Dream recall	98.1	98.5	4.71	4.76	0.78	0.78
Dream control 1	80.6	80.0	3.37	3.54	1.46	1.52
Dream control 2	69.4	67.7	3.01	3.01	1.57	1.64
Dream vividness	95.4	98.5	4.22	4.43	1.15	0.95
Flying dreams	77.8	81.5	3.28	3.58	1.52	1.52
Falling dreams	80.6	86.2	3.39	3.64	1.52	1.39
Pre-lucid dreams	75.0	72.3	2.91	2.86	1.44	1.43
Lucid dreams	67.6	73.8	2.77	3.13	1.48	1.55
False awakenings - type 1	71.3	70.8	2.69	2.88	1.35	1.49
False awakenings - type 2	45.4	48.5	2.09	2.32	1.38	1.55
Sleep terrors[b]	65.7	80.0	2.74	3.05	1.47	1.38
Nightmares[b]	93.5	96.2	3.92	4.05	1.17	1.11
REM sleep behavior disorder[b]	44.4	54.6	2.11	2.29	1.39	1.38
Sleep choking[b]	20.4	26.2	1.50	1.58	1.10	1.09
Sleepwalking	53.7	55.4	2.20	2.33	1.31	1.39
Sleep talking	83.3	83.1	3.53	3.65	1.46	1.44
Confusional arousals	82.4	83.1	3.20	3.37	1.32	1.36
Rhythmic movement disorder	29.6	36.9	1.95	2.16	1.57	1.65
Nocturnal leg cramps	53.7	54.6	2.43	2.58	1.54	1.57
Bruxism (teethgrinding)	50.0	48.5	2.51	2.52	1.68	1.74
Enuresis (bedwetting)	47.2	51.5	2.03	2.02	1.36	1.20
Snoring	59.3	62.3	2.53	2.83	1.47	1.63
Sleep starts	79.6	81.5	3.69	3.74	1.54	1.49
Excessive sleepiness	41.7	30.8	2.05	1.83	1.38	1.36
Cataplexy	38.9	30.0	1.89	1.70	1.26	1.22

[a] 5-point scale: 1= No, 2= Once, 3= 2-10 times, 4= 11-20 times, 5= More than 20 times

[b] These items covered the main symptom of these sleep disorders. Note that agreement with these items does not indicate a definitive diagnosis.

Table 5 Descriptive statistics for the childhood and adulthood anomalous experiences, anomalous beliefs, social desirability and childhood fantasy proneness for WWW surveys 1 and 2

Variable	Mean Response		SD	
	WWW1	WWW2	WWW1	WWW2
Childhood anomalous experiences	1.72[a]	1.71	0.55	0.61
Adulthood anomalous experiences	1.99[a]	1.92	0.68	0.66
Anomalous beliefs	1.55[b]	1.51	0.37	0.40
Social desirability	3.19[c]	3.35	2.06	1.97
Childhood fantasy proneness	8.07[d]	7.76	3.25	3.16

a Anomalous experiences 5-point scale: 1= No, 2= Once, 3= 2-10 times, 4= 11-20 times, 5= More than 20 times

b Anomalous beliefs 3-point scale: 0= False, 1= Uncertain, 2= True

c Social desirability: possible range = minimum 0-10 maximum

d Childhood fantasy proneness: possible range = minimum 0-15 maximum

Table 5 shows that, for both surveys 1 and 2, the number of childhood and adulthood anomalous experiences reported was quite low; on average respondents reported no more than a single episode. However, the mean level of anomalous beliefs was towards the high end of the scale. The mean childhood fantasy proneness score fell around the midpoint of the scale. The mean social desirability score was towards the lower end of the scale, which suggests that, on average, participants did not have a high tendency to give socially desirable responses to questions.

Table 6 Spearman's rho correlations between the incidence of childhood hypnagogic/hypnopompic and sleep experiences, and the incidence of childhood and adulthood anomalous experiences, the level of anomalous beliefs, social desirability and childhood fantasy proneness (WWW survey 1)

Childhood experiences	Child AE	Adult AE	Beliefs	Social des.	Child FP
Hypnagogic imagery	.413 ***	.391 ***	.239 *	- .007	.256 **
Hypnopompic imagery	.441 ***	.364 ***	.142	.109	.124
Exploding head symptoms	.359 ***	.347 ***	.262 **	.096	.218 *
Pre-dormital sleep paralysis	.374 ***	.327 ***	.163	.072	.249 *
Post-dormital sleep paralysis	.258 **	.233 *	.147	.295**	- .007
Dream recall	.201 *	.115	- .021	.061	.099
Dream control 1	.305 **	.202 *	- .029	- .037	.263 **
Dream control 2	.399 ***	.233 *	-. 026	.060	.233 *
Dream vividness	.280 **	.257 **	- .041	- .133	.149
Flying dreams	.234 *	.229 *	- .029	.062	.226 *
Falling dreams	.304 **	.249 *	.031	.066	.155
Pre-lucid dreams	.315 **	.188	- .111	.045	.157
Lucid dreams	.426 ***	.265 **	- .024	.052	.209 *
False awakenings (type 1)	.156	.129	- .013	- .120	.195 *
False awakenings (type 2)	.346 ***	.284 **	.151	.117	.154
Sleep terrors	.398 ***	.309 **	.111	.147	.154
Nightmares	.285 **	.284 **	- .010	.112	.154
REM sleep behaviour disord.	.272 **	.249 *	- .047	- .014	.334 ***
Sleep choking	.286 **	.204 *	.108	- .024	.141
Sleepwalking	.280 **	.249 **	. 073	- .055	.234 *
Sleep talking	.237 *	.141	- .136	- .147	.225 *
Confusional arousals	.235 *	.102	.089	- .103	.257 **
Rhythmic movement disorder	.228 *	.112	.024	.145	- .066
Nocturnal leg cramps	.431 ***	.369 ***	.104	.058	.296 **
Bruxism (teethgrinding)	.199 *	.270 **	.132	.044	.093
Enuresis (bedwetting)	- .122	- .223 *	- .194 *	- .159	.137
Snoring	.067	.003	.015	- .216 *	.219 *
Sleep starts	.145	.102	- .023	.164	- .036
Excessive sleepiness	.246 **	.069	.113	.075	.115
Cataplexy	.282 **	.434 ***	.157	.274 **	.158

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, two-tailed (these relate to the unadjusted criterion values)

Table 7 Spearman's rho correlations between the incidence of childhood hypnagogic/hypnopompic and sleep experiences, and the incidence of childhood and adulthood anomalous experiences, the level of anomalous beliefs, social desirability and childhood fantasy proneness (WWW survey 2)

Childhood experiences	Child AE	Adult AE	Beliefs	Social des.	Child FP
Hypnagogic imagery	.514 ***	.357 ***	.174 *	- .031	.156 *
Hypnopompic imagery	.437 ***	.432 ***	.193 *	- .036	.142
Exploding head symptoms	.510 ***	.342 ***	.131	- .118	.192 *
Pre-dormital sleep paralysis	.484 ***	.470 ***	.185 *	.040	.115
Post-dormital sleep paralysis	.348 ***	.333 ***	.053	- .044	.186 *
Dream recall	.008	.069	- .012	- .122	- .017
Dream control 1	.173 *	.173 *	.102	.061	.246 **
Dream control 2	.186 *	.188 *	.061	.198 *	.178 *
Dream vividness	.279 **	.275 **	.171 *	- .001	.264 **
Flying dreams	.358 ***	.355 ***	.079	.049	.228 **
Falling dreams	.206 *	.243 *	.023	- .001	.267 **
Pre-lucid dreams	.241 **	.196 *	.201 *	.020	.393 ***
Lucid dreams	.362 ***	.315 ***	.207 *	.170 *	.180 *
False awakenings (type 1)	.264 **	.222 **	.154 *	- .046	.363 ***
False awakenings (type 2)	.317 ***	.279 **	.217 **	- .099	.332 ***
Sleep terrors	.348 ***	.283 **	.065	- .161 *	.209 **
Nightmares	.278 **	.192 *	.117	- .080	.312 ***
REM sleep behaviour disord.	.381 ***	.280 **	.067	- .057	.211 **
Sleep choking	.311 ***	.256 **	.045	- .092	.285 **
Sleepwalking	.285 **	.175 *	. 039	- .015	.147 *
Sleep talking	.207 **	.208 **	. 118	- .014	.118
Confusional arousals	.236 *	.145	.055	- .144	.265 **
Rhythmic movement disorder	.284 **	.272 **	.046	- .005	.321 ***
Nocturnal leg cramps	.312 ***	.218 **	.035	- .120	.146 *
Bruxism (teethgrinding)	.153 *	.143	.054	.051	.256 **
Enuresis (bedwetting)	.146 *	.314 ***	.183 *	.033	.217 **
Snoring	.083	- .023	- .057	- .202 *	.114
Sleep starts	.120	.096	.074	- .108	.172 *
Excessive sleepiness	.256 **	.184 *	.102	- .079	.241 **
Cataplexy	.436 ***	.391 ***	.196 *	- .048	.297 ***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, one-tailed (these relate to the unadjusted criterion values)

Table 8 Spearman's rho correlations between childhood fantasy proneness, the incidence of childhood hypnagogic/hypnopompic and sleep experiences, and the incidence of childhood and adulthood anomalous experiences, the level of anomalous beliefs

Childhood variable	Child AE		Adult AE		Beliefs	
	WWW1	WWW2	WWW1	WWW2	WWW1	WWW2
Hypnagogic imagery	.413***	.514***	.391***	.357***	.239*	.174*
Hypnopompic imagery	.441***	.437***	.364***	.432***	.142	.193*
Exploding head symptoms	.359***	.510***	.347***	.342***	.262**	.131
Pre-dormital sleep paralysis	.374***	.484***	.327***	.470***	.163	.185*
Post-dormital sleep paralysis	.258**	.348***	.233*	.333***	.147	.053
Dream recall	.201*	.008	.115	.069	-.021	-.012
Dream control 1	.305**	.173*	.202*	.173*	-.029	.102
Dream control 2	.399***	.186*	.233*	.188*	-.026	.061
Dream vividness	.280**	.279**	.257**	.275**	-.041	.171*
Flying dreams	.234*	.358***	.229*	.355***	-.029	.079
Falling dreams	.304**	.206*	.249*	.243*	.031	.023
Pre-lucid dreams	.315**	.241**	.188	.196*	-.111	.201*
Lucid dreams	.426***	.362***	.265**	.315***	-.024	.207**
False awakenings (type 1)	.156	.264**	.129	.222**	-.013	.154*
False awakenings (type 2)	.346***	.317***	.284**	.279**	.151	.217**
Sleep terrors	.398***	.348***	.309**	.283**	.111	.065
Nightmares	.285**	.278**	.284**	.192*	-.010	.117
REM sleep behaviour disord	.272**	.381***	.249*	.280**	-.047	.067
Sleep choking	.286**	.311***	.204*	.256**	.108	.045
Sleepwalking	.280**	.285**	.249**	.175*	.073	.039
Sleep talking	.237*	.207**	.141	.208**	-.136	.118
Confusional arousals	.235*	.236**	.102	.145*	.089	.055
Rhythmic movement disord.	.228*	.284**	.112	.272**	.024	.046
Nocturnal leg cramps	.431***	.312***	.369***	.218**	.104	.035
Bruxism (teethgrinding)	.199*	.153*	.270**	.143	.132	.054
Enuresis (bedwetting)	-.122	.146*	-.223*	.314***	-.194*	.183*
Snoring	.067	.083	.003	-.023	.015	-.057
Sleep starts	.145	.120	.102	.096	-.023	.074
Excessive sleepiness	.246**	.256**	.069	.184*	.113	.102
Cataplexy	.282**	.436***	.434***	.391***	.157	.196*

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, WWW1 = two-tailed; WWW2 = one-tailed (these relate to the unadjusted criterion values)

Relationships between childhood hypnagogic/hypnopompic and sleep experiences, anomalous experiences and anomalous beliefs

Tables 6-8 show that there was a significant positive correlation between the incidence of childhood anomalous experiences and the incidence of hypnagogic imagery, hypnopompic imagery, exploding head symptoms, pre-dormital and post-dormital sleep paralysis in both surveys. The same relationships also held for the incidence of adulthood anomalous experiences.

There was a significant positive correlation between the incidence of childhood hypnagogic imagery and the level of anomalous beliefs in both surveys. However, in survey 2, there was also a significant positive correlation between the incidence of childhood hypnopompic imagery, pre-dormital sleep paralysis and the level of anomalous beliefs. In survey 1, there was also a significant positive correlation between the incidence of exploding head symptoms and the level of anomalous beliefs.

Tables 6-8 also show that, overall, childhood sleep experiences tended to have significant positive relationships with the incidence of anomalous experiences but generally did not have significant relationships with the level of anomalous beliefs.

In both surveys, there were significant positive correlations between the incidence of anomalous experiences, during childhood or adulthood, and the incidence of a number of childhood dream variables: dream control, dream vividness, flying, falling and lucid dreams, type 2 false awakenings, and symptoms of nightmares and sleep terrors. In survey 1, the incidence of childhood pre-lucid dreams and dream recall were significantly positively correlated with the incidence of childhood anomalous experiences. In survey 2, childhood pre-lucid dreams and type 1 false awakenings were also significantly correlated with the incidence of both childhood and adulthood anomalous experiences.

In both surveys, the childhood incidence of symptoms of some REM sleep (SP, nightmares, REM sleep behaviour disorder) and some arousal disorder parasomnias (sleepwalking, sleep terrors) were related to the incidence of both childhood and adulthood anomalous experiences. The incidences of the latter were also significantly related to the childhood incidence of symptoms of sleep choking, nocturnal leg cramps and cataplexy. In survey 2, childhood and adulthood anomalous experiences were also significantly correlated with childhood symptoms of sleep talking, confusional arousals, rhythmic movement disorder, and excessive sleepiness whereas in survey 1 they were only correlated with childhood anomalous experiences.

In survey, 1 there were no significant correlations between the childhood incidence of sleep/dream experiences and the current level of anomalous beliefs apart from the incidence of enuresis which had a significant negative relationship. In survey 2, the relationship between enuresis and anomalous beliefs was significant but positive. In survey 2 there were also significant positive correlations between the childhood incidence of dream vividness, pre-lucid dreams, lucid dreams, false awakenings (type 1 and 2), cataplexy and the current level of anomalous beliefs.

Relationship with social desirability

Tables 6 and 7 show that, in survey 1, there was a significant positive correlation between the childhood incidence of post-dormital sleep paralysis and the level of social desirability but in survey 2 there were no significant correlations with the childhood incidence of any of the hypnagogic/hypnopompic experiences.

In both surveys, there were no significant correlations between the childhood incidence of the majority of the sleep/dream experiences and the level of social desirability. However, in survey 1, there were significant correlations between social desirability and snoring (negative) and cataplexy (positive); in survey 2, there were significant positive correlations with dream control 2 and lucid dreams and negative correlations with symptoms of sleep terrors and snoring.

Relationship between childhood fantasy proneness and childhood hypnagogic/hypnopompic and sleep experiences

Tables 6 and 7 show that, in both surveys, there were significant positive correlations between the incidence of childhood hypnagogic imagery or exploding head symptoms and the level of childhood fantasy proneness. In survey 2, there was also a significant positive correlation with the incidence of post-dormital sleep paralysis whereas in survey 1 there was a significant positive correlation with pre-dormital sleep paralysis instead.

As with survey 1, there were significant positive correlations between the level of childhood fantasy proneness and the childhood incidence of dream control 1 and 2, flying dreams, lucid dreams, false awakenings (type 1), symptoms of REM sleep behaviour disorder, sleepwalking, symptoms of confusional arousals, and nocturnal leg cramps. In survey 2, there were also significant positive correlations with dream vividness, falling dreams, pre-lucid dreams, false awakenings (type 2), symptoms of sleep terrors, nightmares, sleep choking, rhythmic movement disorder, bruxism, enuresis, sleep starts, excessive sleepiness and cataplexy. In both surveys, there was no significant correlation between the level of childhood fantasy proneness and the childhood incidence of dream recall. There were no significant correlations between childhood fantasy proneness and the childhood incidence of either sleep talking or snoring in survey 2.

Table 9 Spearman's rho correlations between the incidence of childhood and adulthood anomalous experiences, the level of anomalous beliefs, social desirability and childhood fantasy proneness (WWW survey 1).

	Child AE	Adult AE	Beliefs	Social des.	Child FP
Childhood anomalous exp.'s	---				
Adulthood anomalous exp.'s	.692 ***	---			
Anomalous beliefs	.294 **	.468 ***	---		
Social desirability	.085	.082	.008	---	
Childhood fantasy proneness	.368 ***	.273 **	.138	- .253 **	---

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, two-tailed (These relate to the unadjusted criterion values)

Tables 9 and 10 show that in survey 1, there was a significant negative correlation between childhood fantasy proneness and the level of social desirability; in survey 2, there was no significant correlation.

Table 10 Spearman's rho correlations between the incidence of childhood and adulthood anomalous experiences, the level of anomalous beliefs, social desirability and childhood fantasy proneness (WWW survey 2).

	Child AE	Adult AE	Beliefs	Social des.	Child FP
Childhood anomalous exp.'s	---				
Adulthood anomalous exp.'s	.667 ***	---			
Anomalous beliefs	.359 ***	.546 ***	---		
Social desirability	- .017	.052	.235 **	---	
Childhood fantasy proneness	.351 ***	.348 ***	.151 *	- .080	---

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, one-tailed (These relate to the unadjusted criterion values)

Table 11 Spearman's rho correlations between the incidence of childhood and adulthood anomalous experiences, the level of anomalous beliefs, and social desirability.

	Child AE		Adult AE		Beliefs	
	WWW1	WWW2	WWW1	WWW2	WWW1	WWW2
Childhood anomalous exp.'s	----					
Adulthood anomalous exp.'s	.692***	.667***	----			
Anomalous beliefs	.294**	.359***	.468***	.546***	----	
Social desirability	.085	-.017	.082	.052	.008	.235**
Childhood fantasy proneness	.368***	.351***	.273**	.348***	.138	.151*

* $p< 0.05$, ** $p< 0.01$, *** $p< 0.001$, WWW1 = two-tailed; WWW2 = one-tailed

Table 11 shows that, in both surveys, there was a significant positive correlation between the incidence of childhood and adulthood anomalous experiences. In addition, both of these variables also had a significant positive correlation with the level of anomalous beliefs.

Table 11 also shows that childhood fantasy proneness was significantly correlated with the incidence of both childhood, and adulthood anomalous experiences in both surveys. In both surveys there were small positive correlations between childhood fantasy proneness and the current level of anomalous beliefs but only the correlation in survey 2 was significant..

There were no significant correlations between the incidence of childhood or adulthood anomalous experiences and the level of social desirability in either survey but there was a significant positive correlation between the current level of anomalous beliefs and the level of social desirability in survey 2.

Relationships within and between childhood hypnagogic/hypnopompic and sleep experiences

Tables 12 and 13 show that, in both surveys, there were significant positive correlations among the childhood incidence of each of the hypnagogic/hypnopompic experiences (i.e., imagery, exploding head symptoms, sleep paralysis) with the exception of between hypnagogic imagery and post-dormital sleep paralysis.

In both surveys, there were significant positive intercorrelations among the childhood incidences of each of the following variables: dream control (1 and 2), dream vividness, flying dreams, falling dreams, pre-lucid dreams, lucid dreams, and false awakenings (type 1 and 2). In survey 1, the aforementioned variables were also significantly correlated with the incidence of sleep talking. In survey 2, the aforementioned variables, except for dream control, were also significantly intercorrelated with the incidence of symptoms of nightmares and sleep terrors.

The incidences of symptoms of the three arousal disorders (confusional arousals, sleepwalking, sleep terrors) were also significantly inter-correlated in both surveys.

In survey 2, there were significant positive intercorrelations among the childhood incidence of symptoms of the following sleep-wake transition disorders: rhythmic movement disorder, sleep starts, sleep talking, nocturnal leg cramps. These results are similar to those from survey 1 except that in the previous sample there was no significant correlation between the incidence of sleep starts and nocturnal leg cramps.

In survey 2, there were significant positive intercorrelations among the childhood incidence of symptoms of the following: nightmares, pre-dormital and post-dormital sleep paralysis, and REM sleep behaviour disorder. These results are similar to those from the survey 1 except that in the previous sample there was no significant correlation between the incidence of post-dormital sleep paralysis and neither nightmares nor REM sleep behaviour disorder

In both surveys, there were significant positive intercorrelations among the childhood incidence of symptoms of the following: sleep talking, sleepwalking, sleep terrors and nightmares. In the previous sample, each of these variables was also significantly correlated with the incidence of dream vividness; in this sample, with the incidence of confusional arousals, falling dreams, pre-lucid dreams, lucid dreams, and false awakenings (type 1 and type 2). In both samples, the childhood incidence of symptoms of sleep talking, nightmares and sleep terrors were all significantly correlated with the incidence of dream recall.

In both surveys, there were significant positive intercorrelations among the following childhood variables (with the exception of between lucid dreams and sleep terrors symptoms in survey 1 and between sleep talking and hypnagogic imagery in survey 2): pre-lucid dreams, lucid dreams, type 2 false awakenings, symptoms of sleep talking, sleep terrors and the incidence of both hypnagogic and hypnopompic imagery. In survey 2, the incidence of both hypnagogic and hypnopompic imagery were also significantly correlated with the incidence of type 1 false awakenings, dream vividness, symptoms of nightmares, REM sleep behaviour disorder, sleep choking, sleepwalking, and sleep starts. In survey 1, the childhood incidence of flying and falling were both significantly correlated with the incidence of both hypnagogic and hypnopompic imagery but in survey 2 they were only significantly correlated with hypnopompic imagery.

In both surveys, there were significant positive correlations between the childhood incidence of exploding head symptoms and the incidence of dream control (1 and 2), pre-lucid dreams, type 2 false awakenings, symptoms of sleep terrors, REM sleep behaviour disorder, sleep choking, rhythmic movement disorder, and cataplexy. In survey 2, there were also significant positive correlations with flying, falling and lucid dreams, symptoms of nightmares, sleepwalking, sleep talking, confusional arousals, bruxism and excessive sleepiness.

In both surveys, there were significant positive correlations between the childhood incidence of sleep paralysis (either pre- or post-dormital) and the incidence of pre-lucid dreams, type 2 false awakenings and symptoms of sleep terrors. In addition, in survey 2, both pre- and post-dormital sleep paralysis had significant positive correlations with the

Table 12 Spearman's rho correlations between the incidence of childhood hypnagogic/hypnopompic and sleep experiences (WWW survey 1)

	HG	HP	Explod	Pre-SP	Post-SP	Recall	Cont1	Cont2	Vivid	Fly	Fall	Pre-lucid	Lucid	FAW1	FAW2
HG	---														
HP	.433***	---													
Explod	.405***	.219*	---												
Pre-SP	.212*	.318**	.373***	---											
Post-SP	.176	.353***	.284**	.472***	---										
Recall	.149	.098	.128	.079	.057	---									
Cont1	.266**	.127	.225*	.118	.027	.322***	---								
Cont2	.315**	.172	.272**	.159	.117	.312**	.781***	---							
Vivid	.166	.218*	.115	.185	.055	.327**	.362**	.413***	---						
Fly	.233*	.255**	.167	.211*	.086	.273**	.424***	.399***	.361***	---					
Fall	.275**	.321**	.135	.176	.241*	.314**	.357***	.333***	.363***	.536***	---				
Pre-lucid	.255*	.276**	.306**	.316**	.236*	.148	.461***	.462***	.299**	.452***	.474***	---			
Lucid	.249*	.297**	.136	.225*	.112	.214*	.544***	.547***	.234*	.444***	.381***	.607***	---		
FAW1	.111	.292**	-.033	.176	.111	.214*	.315**	.336***	.319**	.229*	.256**	.300**	.382***	---	
FAW2	.265**	.378***	.209*	.410***	.315**	-.015	.201*	.303**	.222*	.203*	.192*	.349***	.317**	.571***	--
Terrors	.328**	.322**	.318**	.255**	.247**	.231*	.143	.281**	.240*	.209*	.382***	.249*	.167	.161	.338***
Nmares	.182	.184	.071	.202*	.100	.340***	.376***	.383***	.319**	.249*	.375***	.169	.176	.176	.168
REM SBD	.119	.266**	.277**	.255**	.142	.145	.073	.104	.182	.147	.178	.112	.125	.262**	.164
Choke	.132	.157	.302**	.125	.051	-.083	.137	.210*	-.001	.132	.235*	.249*	.180	.049	.174
Walk	.164	.058	.045	.133	.211*	.162	.153	.156	.221*	.193	.341***	.061	.155	.131	.171
Talk	.264**	.242*	.119	.124	.120	.254**	.330**	.350***	.399***	.243*	.426***	.298**	.252**	.251**	.221*
Confus	.307**	.192	.129	-.010	.058	.323**	.313**	.371***	.200*	.083	.261**	.144	.216*	.370***	.279**
Rhythm	.001	.106	.254**	.144	.217*	.059	.223*	.197*	.138	.017	.110	.199*	.171	.103	.193*
N. leg	.245*	.092	.246*	.172	.127	.061	.310**	.343***	.164	.143	.141	.140	.179	.151	.256**
Brux	.091	.021	.136	.276**	.166	.031	-.009	-.013	.145	.105	.162	.055	-.014	-.071	.073
Enures	-.095	-.086	-.034	.084	.033	.003	-.027	-.003	-.025	.044	-.026	.048	-.043	.116	-.066
Snore	.085	.091	.174	.178	-.033	.133	.234*	.220*	.127	.225*	.272**	.198*	.171	.255**	.199*
Starts	.204*	.168	.161	.137	.234*	.190	.092	.223*	.049	.151	.301**	.222*	.225*	.148	.246*
Excess	.293**	.227*	.166	.171	.112	.066	.051	.131	.157	.225*	.175	.202*	.156	.288**	.304**
Catap	.325**	.418***	.281**	.277**	.326**	.105	.188	.275**	.230*	.073	.225*	.209*	.219*	.153	.338***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, two-tailed

Table 12 Spearman's rho correlations between the incidence of childhood hypnagogic/hypnopompic and sleep experiences (WWW survey 1)

	Terrors	Nmares	REM SBD	Choke	Walk	Talk	Confus	Rhythm	N. leg	Brux	Enures	Snore	Starts	Excess	Catap
Terrors	---														
Nmares	.565***	---													
REM SBD	.416***	.233*	---												
Choke	.287**	.223*	.147	---											
Walk	.271**	.250**	.392***	.079	---										
Talk	.380***	.278**	.418***	.093	.512***	---									
Confus	.282**	.274**	.158	.107	.283**	.441***	---								
Rhythm	.163	.131	.140	.314**	.171	.207*	.060	---							
N. leg	.183	.283**	.181	.293**	.209*	.253**	.239*	.206*	---						
Brux	.132	.128	.113	.110	.238*	.156	-.056	.214*	.187	---					
Enures	-.004	.087	-.031	-.023	-.027	-.038	.039	-.137	.043	.009	---				
Snore	.186	.243*	.232*	.354***	.079	.335***	.339***	.052	.157	.226*	.106	---			
Starts	.401***	.285**	.171	.306**	.222*	.334***	.229*	.207*	.115	.142	.175	.110	---		
Excess	.253**	.151	.109	.136	.227*	.259**	.387***	.138	.261**	.093	.115	.219*	.088	---	
Catap	.318**	.170	.178	.279**	.154	.253**	.186	.189	.339***	.124	-.022	.105	.270**	.192*	---

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, two-tailed

Table 13 Spearman's rho correlations between the incidence of childhood hypnagogic/hypnopompic and sleep experiences (WWW survey 2)

	HG	HP	Explod	Pre-SP	Post-SP	Recall	Cont1	Cont2	Vivid	Fly	Fall	Pre-lucid	Lucid	FAW1	FAW2
HG	---														
HP	.379***	---													
Explod	.414***	.400***	---												
Pre-SP	.501***	.456***	.533***	---											
Post-SP	.122	.497***	.236**	.376***	---										
Recall	.065	.098	.090	.024	.125	---									
Cont1	.058	.066	.174*	.128	.112	.205*	---								
Cont2	.129	.235**	.203*	.191*	.192*	.129	.576***	---							
Vivid	.201*	.211**	.142	.221**	.124	.347***	.320***	.331***	---						
Fly	.143	.217**	.300***	.249**	.157*	.082	.259**	.261**	.217**	---					
Fall	.072	.347***	.192*	.259**	.253**	.111	.321***	.219**	.353***	.438***	---				
Pre-lucid	.179*	.198*	.220**	.202*	.303***	.165*	.414***	.333***	.305***	.349***	.336***	---			
Lucid	.243**	.288***	.242**	.373***	.291***	.120	.504***	.609***	.385***	.451***	.364***	.558***	---		
FAW1	.155*	.295***	.148*	.234**	.389***	.194*	.364***	.307***	.305***	.257**	.454***	.503***	.440***	---	
FAW2	.202*	.302***	.168*	.302***	.257**	.052	.290***	.219**	.228**	.155*	.275**	.443***	.323***	.684***	--
Terrors	.252**	.427***	.295***	.352***	.227**	.160*	.098	.164*	.348***	.305***	.383***	.288***	.256**	.355***	.275**
Nmares	.219**	.295***	.235**	.222**	.249**	.167*	.239**	.125	.348***	.238**	.328***	.399***	.190*	.352***	.270**
REM SBD	.219**	.381***	.183*	.155*	.253**	.128	.153*	.175*	.170*	.130	.187*	.240**	.087	.313***	.194*
Choke	.207*	.245**	.202*	.250**	.156*	.037	.076	.042	-.003	.175*	.225**	.167*	.098	.240**	.418***
Walk	.172*	.173*	.199*	.129	.212**	.058	.192*	.137	.066	.146	.215**	.270**	.226**	.250**	.191*
Talk	.157	.347***	.163*	.213**	.230**	.230**	.070	.173*	.210**	.113	.292***	.219**	.170*	.272**	.243**
Confus	.090	.071	.229**	.183*	.161*	.185*	.147*	.180*	.410***	.227**	.218**	.273**	.288***	.353***	.344***
Rhythm	.053	.183*	.197*	.292***	.240**	.115	.001	.001	.086	.148*	.158*	.081	.020	.171*	.221**
N. leg	.124	.206*	.132	.203*	.189*	.073	.105	.004	.075	.219**	.250**	.182*	.093	.239**	.375***
Brux	.092	.232**	.186*	.151*	.091	.060	.155*	.222**	.252**	.082	.280**	.105	.096	.113	.205*
Enures	.218**	.080	.143	.152*	.141	.015	.134	.145	.115	.173*	.142	.155*	.210**	.145	.087
Snore	.061	.123	.104	.097	.112	.231**	.093	.081	.132	.098	.279**	.205*	.102	.071	.016
Starts	.254**	.318***	.121	.213**	.137	.111	.084	.208**	.173*	-.092	.079	.236**	.211**	.108	.202*
Excess	.218**	.250**	.196*	.243**	.104	.065	.194*	.235**	.321***	.207**	.318***	.351***	.294***	.374***	.426***
Catap	.213**	.103	.308***	.394***	.130	.028	.067	.071	.223**	.130	.134	.103	.137	.148*	.217**

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, one-tailed

Table 13 Spearman's rho correlations between the incidence of childhood hypnagogic/hypnopompic and sleep experiences (WWW survey 2)

	Terrors	Nmares	REM SBD	Choke	Walk	Talk	Confus	Rhythm	N. leg	Brux	Enures	Snore	Starts	Excess	Catap
Terrors	---														
Nmares	.567***	---													
REM SBD	.522***	.366***	---												
Choke	.201*	.204*	.251**	---											
Walk	.307***	.198*	.419***	.114	---										
Talk	.481***	.350***	.445***	.111	.384***	---									
Confus	.353***	.232**	.088	.082	.179*	.254**	---								
Rhythm	.212**	.064	.244**	.286**	.161*	.319***	.244**	---							
N. leg	.355***	.263**	.261**	.267**	.318***	.226**	.216**	.227**	---						
Brux	.239**	.211**	.075	.201*	.141	.230**	.097	.059	.232**	---					
Enures	.114	-.044	.190*	.134	.168*	.151*	.323***	.141	.082	.185*	---				
Snore	.270**	.171*	.149*	.056	.042	.265**	.049	.189*	.182*	.215**	.034	---			
Starts	.335***	.296***	.213**	.163*	.117	.362***	.204*	.161*	.237**	.185*	.118	.179*	---		
Excess	.406***	.242**	.294***	.189*	.248**	.293***	.328***	.278**	.271**	.060	.104	.138	.190*	---	
Catap	.372***	.261**	.200*	.245**	.133	.091	.360***	.360***	.351***	.233**	.216**	.011	.124	.302***	---

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, one-tailed

incidence of type 1 false awakenings, lucid dreams, flying dreams, falling dreams, dream control 2, symptoms of nightmares, REM sleep behaviour disorder, sleep choking, sleep talking, confusional arousals, rhythmic movement disorder and nocturnal leg cramps.

Discussion

Although atypical of the general population and the WWW user population (e.g., GVU Center, 1998), the demographics of the two WWW samples are very similar in terms of the sex ratio (mostly female), age range and average age (c. 30 years), their nationalities (mostly American) and the fact that many had been or were practising some form of mental discipline, exercise or self-improvement program.

The incidences of the majority of the HG/HP, dream and sleep experiences were similar in both surveys and most estimates were within 8% of each other. The means and standard deviations for these items plus the fantasy proneness, anomalous experiences, anomalous beliefs and social desirability measures were also similar in both surveys and there were also similar patterns of correlations across the two samples. There were also very few cases of multiple submissions of responses from the same IP address. Although the latter is a crude detector of deliberate attempts to bias the results, in my opinion a person would have had to have been particularly well-motivated and organised to send data from different machines (or to make it appear that they were from different machines) for two samples. Even if they had done so it is unlikely that the results would be so similar (unless they were responsible for all of the data submitted). The above findings suggest to me that the WWW may have been a fairly reliable and secure method of data collection in this instance.

One point to note is that the incidences of some of the sleep-related experiences were higher than previous survey estimates. In terms of HG and HP imagery, the WWW survey estimates of the proportion of people who had experienced it (HG 77%, 75%; HP 68%, 61%) are within the bounds of other estimates of 61-63% (McKellar & Simpson, 1954; McKellar, 1957) or c.75% (Glicksohn, 1989; Richardson et al., 1981) for HG imagery and 68% for HP imagery (Richardson et al., 1981). In terms of the estimates of exploding head symptoms, comparisons with previous estimates are problematic for two reasons, (1) there do not appear to be any published estimates and (2) the exploding head symptoms item is problematic and ambiguous in the way that it has been phrased, "Have you ever experienced sensations of explosions and/or sensations of flashing lights in the head as you are falling asleep?" Clearly a person giving a positive response to this item might only experience flashing lights but not sensations of explosions. The reported incidences of sleep paralysis (pre-dormital 46%, 45%; post-dormital 49%, 41%) fall within the 40-50% figure estimated by the International Classification of Sleep Disorders (ASDA, 1990).

In terms of the childhood dream experiences, the incidences were generally high with more than 75% of the samples reporting many of them. Previous surveys of these kinds of dream experiences have often found that 50-60% or more of their samples have experienced them (e.g., Blackmore, 1982b, 1983, 1984, 1986; Glicksohn, 1989; Kohr, 1980; LaBerge & Gackenbach, 2000; Palmer, 1979; Rose & Blackmore, 1996). Some of the estimates for the childhood sleep disorder symptoms are much higher than the ICSD estimates too, e.g., sleep terrors, nightmares, REM sleep behaviour disorder. The first point to make is that my surveys are dealing with reports of possible symptoms and not definitive diagnoses. Diagnoses of sleep disorders can be difficult and may require a detailed history and the ruling out of differential diagnoses (see ASDA, 1990). It's possible that some sleep disorder symptoms, such as those for sleep terrors, can be confused (by those who experience them) with those for other disorders, such as nightmares. Another explanation for some of these higher estimates may be that the participants self-selected themselves because of their experience of such sleep-related phenomena and so the estimates might be accurate for such a population; alternatively it may be, as Council et al. (1991) and Spanos et al. (1995) have suggested, that some participants have an acquiescent response bias when it comes to unusual experiences. If the results of the surveys were entirely due to acquiescent response biases then we might have expected high scores on, and positive correlations among, all of the variables. However, although the mean level of the anomalous beliefs measure and some of the sleep-related items was high, the mean anomalous experiences and social desirability scores fell on the lower end of the scales. Social desirability does not seem to have had a large overall impact as it was not significantly correlated with the majority of the variables in the surveys, although the magnitude of the correlations may have been lowered by the relatively poor reliability of the social desirability scale.

The results of both WWW surveys have indicated that the level of childhood fantasy proneness and the incidences of a number of childhood hypnagogic/hypnopompic and sleep experiences were significantly correlated with the incidence of anomalous experiences.[8] The results are more equivocal with regard to the current level of anomalous beliefs. Of the aforementioned childhood predictor variables, only the incidence of childhood hypnagogic imagery had a significant correlation with the current level of anomalous beliefs in both surveys. A number of other hypnagogic/hypnopompic and dream variables had significant positive correlations with the level of beliefs in survey 2.

However, the incidences of anomalous experiences, during childhood or adulthood, were significantly correlated with the current level of anomalous beliefs in both surveys. There were also significant correlations both within and between the categories of hypnagogic/hypnopompic experiences, dream variables, and parasomnias which may suggest the existence of a sleep-related imagery/experience factor.

Although these findings are only correlational, with relatively small to medium effect sizes,[9] and do not therefore allow any causal statements to be made, they do support the possibility that childhood fantasy proneness and the hypnagogic/hypnopompic and sleep states may be conducive to anomalous processes or that normal waking imagery and/or hypnagogic/hypnopompic and sleep experiences may be misinterpreted as being anomalous events. The results also support the relationship between childhood fantasy proneness and

---

[8] The anomalous experience scores could reflect experiences that occurred during one or more of the waking, hypnagogic/ hypnopompic, or sleeping states.

[9] Rosenthal and Rosnow (1991) note that a correlation coefficient of 0.1 is considered to be a small effect size and one of 0.3 to be a medium effect size. The mean correlations between the childhood incidence of sleep/dream experiences and the incidence of anomalous experiences for surveys 1 and 2 were $r = .257$, $r = .249$ for childhood and $r = .193$, $r = .218$ for adulthood. . The mean correlations between the childhood incidence of hypnagogic/hypnopompic experiences and the incidence of anomalous experiences were $r = .369$, $r = .459$ for childhood and $r = .332$, $r = .387$ for adulthood. Clearly, there are also other factors that account for a large proportion of the variance.

childhood sleep-related experiences. However, these relationships between fantasy proneness, hypnagogic/hypnopompic and sleep experiences and anomalous experiences could also be due to other variables that influence both of them. These findings also provide some support for the theories of boundary structure (Hartmann, 1991) and transliminality (Thalbourne & Delin, 1994).

In summary, these results provide some preliminary support for the proposed models and have identified the need for factor analysis in order to investigate the possibility that more general underlying factors may be underlying some of the variables measured. The inter-relationships among the sleep-related items will be discussed briefly here but the relationships among the variables measured will be discussed more fully (see Chapter 11) once the SEM analyses have been conducted because this technique has the advantage of taking the effects of other variables into account.

Inter-relationships among the sleep-related experiences

The majority of the HG/HP experience items were significantly positively intercorrelated in both surveys. This suggests the possibility of a HG/HP experience factor. It is well-known that HG/HP imagery can occur along with sleep paralysis (e.g., ASDA, 1990; Cheyne, Newby-Clark, & Rueffer, 1999; Goode, 1962; Spanos et al., 1995).

Green and McCreery (1994) have proposed that there might be inter-relationships among a number of experiences such as lucid dreams, false awakenings, OBEs and apparitional experiences. They believe that these experiences might be 'metachoric experiences' "in which the normal perceptual environment is entirely replaced by a hallucinatory one." (p.56). The results of both surveys support these proposed relationships and indicated that the following childhood sleep experiences were all significantly correlated with each other: dream control 1 and 2, dream vividness, flying dreams, falling dreams, pre-lucid dreams, lucid dreams, and false awakenings (both type 1 and type 2). This suggests that there might be some kind of underlying dream factor. Previous research has also found that false awakenings, lucid dreams, dream control 2 (control or create) and falling dreams are all associated with each other (Blackmore, 1983; Glicksohn, 1989; van Eeden, 1913).

The incidences of childhood pre-lucid dreams, lucid dreams, false awakenings (type 2), sleep talking and sleep terrors were all significantly correlated with the incidence of both childhood hypnagogic and hypnopompic imagery in both surveys. Previous research has also found that the incidences of hypnagogic and hypnopompic imagery are related to each other and also to false awakenings, lucid dreams and attention to subjective experience (Blackmore, 1983; Glicksohn, 1989, 1990; Spanos et al., 1995); hypnagogic imagery has also been found to be related to dream recall and dream control (Glicksohn, 1989, 1990). However, in both surveys, neither hypnagogic nor hypnopompic imagery was significantly correlated with the incidence of dream recall. In survey 1, hypnagogic imagery was significantly correlated with both forms of dream control but in survey 2 only one form of dream control was significantly correlated with hypnopompic imagery.

The incidences of three arousal disorders (confusional arousals, sleepwalking, sleep terrors) were all significantly inter-correlated which supports previous findings (ASDA, 1990). Episodes of confusional arousal have been reported by sufferers of sleep terrors and sleepwalking and vice versa (ASDA, 1990). Previous studies have also found relationships between sleepwalking and sleep talking (Fisher & Wilson, 1987; Spanos et al., 1995) and among sleepwalking, sleep terrors and nightmares (Spanos et al., 1995; Thorpy & Glovinsky, 1987).

The incidences of four sleep-wake transition disorders (rhythmic movement, sleep starts, sleep talking, nocturnal leg cramps) were all significantly inter-correlated with each other (except for sleep starts and nocturnal cramps in survey 1). Sleep talking may also be precipitated by other sleep disorders such as sleep terrors, confusional arousals and REM sleep behaviour disorder (ASDA, 1990).

The incidences of three parasomnias usually associated with REM (nightmares, sleep paralysis, REM sleep behaviour disorder) were all significantly inter-correlated (except for post-dormital sleep paralysis which did not correlate with either of the others in survey 1).

These results support the ICSD classifications (ASDA, 1990) and also suggest the possibility of a sleep disorder symptoms factor(s).

Ohayon et al., (1996) found that those who reported having nightmares more than once per month were significantly more likely to report hypnagogic and/or hypnopompic imagery. There were significant positive correlations between the frequency of childhood hypnagogic and hypnopompic imagery and childhood nightmares in survey 2 but the correlations were in the same direction but non-significant in survey 1. In both surveys, there were significant positive correlations between the childhood incidence of sleep paralysis (either pre-dormital or post-dormital) and the incidence of pre-lucid dreams, type 2 false awakenings and symptoms of sleep terrors. Previous research has also found that false awakenings (Green & McCreery, 1994; Rose et al., 1997) and also nightmares/night terrors and lucid dreams/dream control are associated with reported cases of sleep paralysis (Rose et al., 1997).

Spanos et al. (1995) found that night terror/nightmare, sleep talking/ walking, night imagery (dream recall, vividness, HG/HP imagery) dimensions and lucid dreaming were all significantly inter-correlated with each other but not with the frequency of sleep paralysis. There have also been a couple of reported cases of hypnagogic/hypnopompic-like imagery occurring during sleepwalking episodes (Kavey & Whyte, 1993). Spanos et al. (1995) also found that night terror/nightmare and sleep talking/walking dimensions were significantly correlated with the intensity of sleep paralysis. In support of Spanos et al. (1995), both surveys found significant inter-correlations among the incidence of sleep talking, sleepwalking, sleep terrors, and nightmares. In survey 1, each of these variables was also significantly correlated with dream vividness. In both surveys, the incidence of symptoms of sleep talking, nightmares and sleep terrors were all significantly correlated with the incidence of dream recall. However, contrary to Spanos et al. (1995), the incidence of sleep terrors, nightmares, lucid dreams and sleepwalking were significantly correlated with the incidence of either or both pre- and post-dormital sleep paralysis in both surveys. Sleep talking was also correlated with the incidence of both forms of sleep paralysis in survey 2.

Although these results suggest that there might be underlying HG/HP, dream experience and sleep disorder symptoms factors, such factors may not necessarily be orthogonal. Although hypnagogic/hypnopompic and sleep imagery seem to be related to each other to some extent, are they also related to waking imagery? Is there a waking-sleeping imagery factor involved? In support of this hypothesis, both surveys found a significant correlation between childhood fantasy proneness, hypnagogic imagery and a number of dream variables.

The factor structure of these sleep-related items will be investigated in the following chapter, along with the dimensionality of the other measures.

Chapter 8

Factor analyses of items used in WWW surveys 1 and 2

Factor analysis of the various measures was considered to be a useful procedure for a number of reasons: (1) apart from social desirability, the measures had been newly-created (or adapted from existing questionnaires) for this study and the underlying factor structure was unknown, (2) previous research has suggested that measures of paranormal experiences/beliefs may not be unidimensional (e.g., Clarke, 1991; Gallagher et al., 1994; Grimmer & White, 1990; Irwin, 1993a; Lawrence, 1995a, 1995b, 1998; Sparks et al., 1997; Thalbourne & Delin, 1993; Tobacyk, 1995a, 1995b), (3) there were a high number of intercorrelations among the sleep-related items, which suggested the possibility of underlying factors.

What is factor analysis?

Factor analysis is a summarisation and data reduction technique that examines the inter-relationships among a large number of variables (Neill, Pullig, Ross, & Black, 1999, p. 37). For a good introduction to factor analysis, I recommend Kline (1994), Tabachnik and Fidell (1996), Hair et al. (1998) and Gorsuch (1983).

Although principal components and factor analysis (also known as principal axis factoring) techniques differ[10] [11] in that the former identifies components and the latter identifies factors, both techniques tend to be referred to as 'factor analysis' (Kline, 1994; Tabachnik & Fidell, 1996). These factors (or latent variables) may represent more general concepts (e.g., intelligence) which may account for the

[10] Note that other factor extraction techniques are available, e.g., maximum likelihood factoring, alpha factoring, but principal components and principal factors are the most common (Tabachnik & Fidell, 1996, p. 662).

[11] The difference between principal components and factor analysis relates to the variance that is analysed; the former analyses variance whilst the latter analyses covariance. With principal components analysis, all of the variance in the variables is analysed whereas with factor analysis only shared variance is analysed i.e., the variance that each observed variable shares with the other variables (Tabachnik and Fidell, 1996, p. 637).

relationships among the individual variables (e.g., verbal, problem-solving ability) which are said to load on these factors.

What is factor analysis used for?

The main uses of factor analysis are (1) to summarise patterns of correlations among measured variables, (2) to reduce a larger set of variables into a smaller number of factors, (3) to look at the dimensionality of a psychometric scale, and (4) to test a theory about patterns of correlations believed to underlie a particular process or concept (Gorsuch, 1983; Tabachnik & Fidell, 1996).

There are two main kinds of factor analysis: exploratory and confirmatory (Kline, 1994; Tabachnik & Fidell, 1996). Exploratory factor analysis tends to be used when there might be relationships among a number of variables and the researcher wishes to see whether and how they could be summarised by a number of factors. This is often useful for generating hypotheses for further research. Confirmatory factor analysis is used to test hypotheses or theories about the structure of relationships among observed variables.

Combination of WWW samples 1 and 2

For the present research, factor analysis was considered to be inappropriate on the two individual WWW samples because the sample sizes were too small to give a reliable and robust solution. It is generally suggested that the sample size needs to be at least 200-300, though 100 might be sufficient if the factor structure is clear (Gorsuch, 1983; Kline, 1993, 1994; Neill et al., 1999; Tabachnik & Fidell, 1996).

Both samples of data from surveys 1 and 2 were collected in an identical manner. Because the two individual samples had obtained similar results, in terms of correlations, it was thought that combining the two samples together would provide a sufficiently large overall sample that would then be more appropriate for factor analysis. However, if heterogeneous subsamples are combined to form one large sample, the overall correlation coefficient may be affected and may be different to that obtained with the individual subsamples (Howell, 1987, pp. 247-248).

Thus, before combining WWW samples 1 and 2, the means and variances for the samples were compared and a series of nonparametric Mann-Whitney tests were carried out on the items from the main measures (and the overall score, where applicable) to check whether there were any significant differences. The Mann-Whitney tests found that there were no significant differences between the two samples on the majority of the individual items or the overall measures (i.e., anomalous beliefs, childhood-adulthood anomalous experiences, childhood sleep-related experiences, childhood fantasy proneness, and social desirability) apart from on one item concerning belief in inexplicable outbreaks of noises ($U = 5718$, $p = .008$, 2-tailed). The majority of the variances were of a similar magnitude in both samples. There were no significant differences in age either. The proportions of males/females and different nationalities were also similar in both samples. A comparison of the participants' IP addresses from both samples indicated that there were no duplications that might have suggested repeated participation. This suggests that the two samples might be homogenous subsamples from the same population and thus it would be acceptable to join them together.

Initial examination of the data

Prior to the factor analysis, a number of checks were made on the data following recommendations made by Tabachnik & Fidell (1996, p. 705).

Sample size

Surveys 1 and 2 had 108 and 130 valid cases, respectively, thus giving a combined $N = 238$. Note that nine cases were subsequently removed because of missing data (see Missing data section). The ratio of participants to variables should ideally be at least 3:1 (Kline, 1993, 1994) or 5:1 (Neill et al., 1999) and the ratio of participants to factors should be at least 20:1 (Arindel & van der Ende, 1985). These ratios were satisfactory in all cases.

Table 14 Participant:variable ratios for measures to be factor analysed

Measure	No. of items	Participant:Variable Ratio[a]
Sleep-related	30	7.63:1
Childhood FP	15	15.27:1
Child-adulthood AE's	42	5.45:1
Anomalous beliefs	20	11.45:1
Social desirability	10	22.90:1

[a] based on N = 229

Table 15 Participant:factor ratios for measures to be factor analysed

Measure	No. of factors extracted	Participant:Factor Ratio[a]
Sleep-related	3	76.3:1
Childhood FP	2	114.5:1
Child-adulthood AE's	2	114.5:1
Anomalous beliefs	2	114.5:1
Social desirability	2	114.5:1

[a] based on N = 229

Missing data

An inspection of the data file in EQS suggested that the missing data were reasonably randomly distributed. The maximum number of missing cases on the main items was eight. Nine cases seemed to have a lot of missing data and these were excluded.[12] Thus, the subsequent factor analyses are based on N = 229.

Outliers

An examination of boxplots and standardised scores ($z > +/- 3.291$, $p < .001$) for the overall scores on the measures indicated that there were a lot of univariate outliers. The outliers were not removed for a number of reasons: (1) the distributions of anomalous experiences and beliefs in the true population may be skewed and so some

[12] These exclusions were in addition to those made prior to analysis of the individual samples.

of the outliers in the sample may be genuine, (2) deletion would result in the loss of too many cases.

Normality

Univariate analysis revealed that the majority of the variables on each measures were skewed or kurtotic. According to Kolmogorov-Smirnov tests (with Lilliefors significance correction), the distributions of all variables were significantly different from normality ($p < .001$). Despite this, the variables were not transformed for the following reasons: (1) the populations from which this sample was drawn may not necessarily be normally-distributed, (2) transformation would make interpretation of the measures more difficult, e.g., where the responses related to frequencies, (3) with factor analysis, the solution may be degraded but may still be useful even if the variables are not normally-distributed (Tabachnik & Fidell, p. 640).

Factorability of the correlation matrix

If a set of items is reflecting a latent variable or factor then one would expect a series of significant intercorrelations among them. One rule of thumb used to assess the potential factorability of a correlation matrix is to look for numerous significant correlations greater than 0.3 (Tabachnik & Fidell, 1996, p. 641; Neill et al., 1999, p. 40). There were numerous significant intercorrelations greater than 0.3 among the anomalous belief items, the childhood-adulthood anomalous experience items, and the childhood sleep-related experience items. There were also significant intercorrelations among the childhood fantasy proneness and social desirability items. It therefore seemed worthwhile to carry out factor analyses on each of these proposed measures.

The Kaiser-Meyer-Olkin measure of sampling adequacy was also checked for each correlation matrix. Ideally, the measure should be greater than 0.6 for good factor analysis (Tabachnik & Fidell, 1996, p. 642). The correlation matrix of all five proposed measures met this criterion: anomalous beliefs .911, childhood-adulthood anomalous experiences .807, childhood sleep-related experiences .833, childhood fantasy proneness .794, social desirability .681.

Multi-collinearity and singularity

In order to check for possible multi-collinearity, the correlation matrix for each scale was checked to see if there were any extremely high intercorrelations greater than 0.8-0.9. (Bryman & Cramer, 1997; Tabachnik & Fidell, 1996). There were two correlations which were greater than or equal to 0.8; one between items relating to beliefs that intelligent life-forms have visited and communicated with people here on Earth ($r = .800$) and one between items relating to childhood and adulthood experiences of having been on board a UFO ($r = .873$)

If the determinant of the correlation matrix R and the eigenvalues associated with some factors approach zero then multi-collinearity or singularity may be present (Tabachnik & Fidell, 1996). If the determinant is in the region of .0001 or so, with eigenvalues in the region of .001, there may be a problem with stability (Fidell, 1998, personal communication).

Table 16 shows that the childhood-adulthood anomalous experience scale may potentially have multicollinearity problems because it has a couple of very small eigenvalues and the determinant of the matrix is also very small. The UFO boarding items would seem to be the items that may lead to instability of the solution since they have a very high correlation. It is not expected that many people would answer in the affirmative to this item and even fewer would be expected to report more than one experience.

Table 16 Determinants of the matrices and smallest eigenvalues for the measures to be factor analysed

Items	Determinant	Smallest eigenvalue
Anomalous beliefs	1.95×10^{-5}	.132
Childhood-adulthood AE's	9.22×10^{-13}	.0996
Childhood sleep-related experiences	4.06×10^{-5}	.186
Childhood fantasy proneness	7.78×10^{-2}	.377
Social desirability	0.414	.542

Factor analysis

Principal components analyses and scree tests (using the eigenvalue greater than 1 criterion) were carried out initially for each measure (as recommended by Kline, 1993, p. 140) to determine the number of factors for subsequent extraction and rotation using principal factor analysis (Kline, 1994). Missing data were replaced with the mean value for that particular variable.

Principal components

Anomalous beliefs

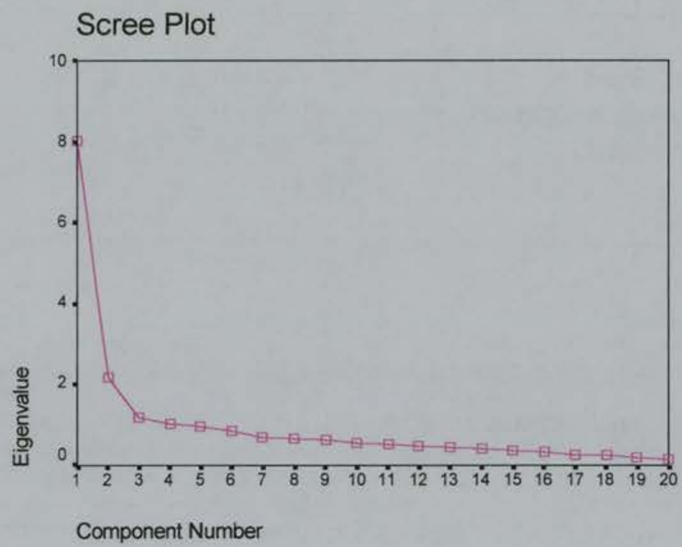


Figure 11 Scree plot for anomalous beliefs components

Table 17 Eigenvalues and percentage of variance for anomalous beliefs components

Component	Initial eigenvalue[a]	% of variance
1	8.009	40.047
2	2.165	10.824
3	1.180	5.900
4	1.033	5.164

[a] only eigenvalues greater than 1 are shown

The scree slope (Figure 11) suggested that there were 2 major components to the anomalous belief measure that accounted for 50% of the variance (see Table 17). This result suggested that 2 factors should be extracted in the principal factor analysis.

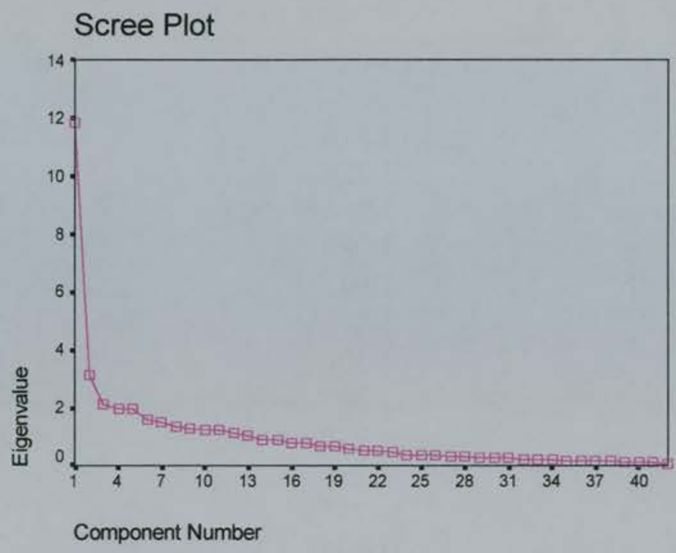


Figure 12 Scree plot for childhood/adulthood anomalous experience components

The scree slope (Figure 12) suggested that there were 2 major components to the measure of childhood and adulthood anomalous experiences that accounted for 35% of the variance (see Table 18). This result suggested that 2 factors should be extracted in the principal factor analysis. However, a slight peak around components 3-5 was noted. Orthogonally- and obliquely-rotated solutions based on the extraction of 5 factors were obtained but were not as clear or as easily interpretable as the 2 factor solution.

Table 18 Eigenvalues and percentage of variance for anomalous experience components

Component	Initial eigenvalue[a]	% of variance
1	11.818	28.139
2	3.124	7.437
3	2.085	4.964
4	1.980	4.713
5	1.941	4.621
6	1.578	3.758
7	1.500	3.573
8	1.347	3.208
9	1.279	3.046
10	1.227	2.921
11	1.215	2.893
12	1.108	2.639
13	1.025	2.439

[a] only eigenvalues greater than 1 are shown

Childhood sleep-related experiences

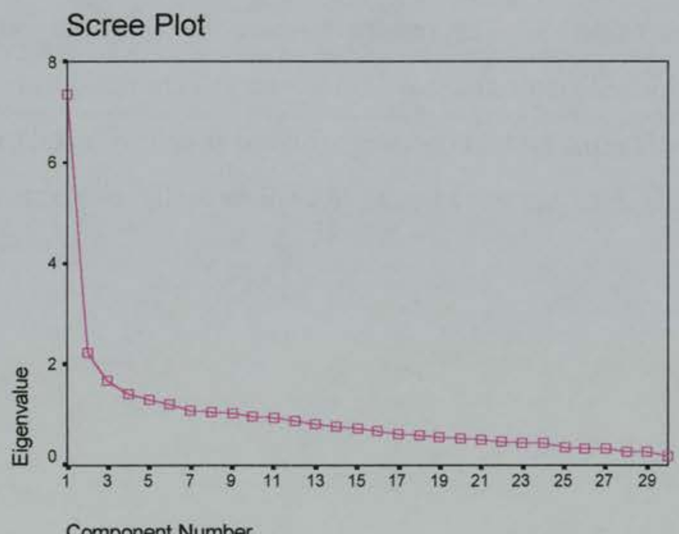


Figure 13 Scree plot for childhood sleep-related components

The scree slope (Figure 13) suggested that there were 3 major components to the measure of childhood sleep-related experiences that accounted for 37% of the variance (see Table 19). This result suggested that 3 factors should be extracted in the principal factor analysis.

Table 19 Eigenvalues and percentage of variance for childhood sleep-related components

Component	Initial eigenvalue[a]	% of variance
1	7.637	24.558
2	2.231	7.436
3	1.681	5.604
4	1.417	4.724
5	1.308	4.359
6	1.203	4.010
7	1.101	3.671
8	1.047	3.488
9	1.026	3.419

[a] only eigenvalues greater than 1 are shown

Childhood fantasy proneness

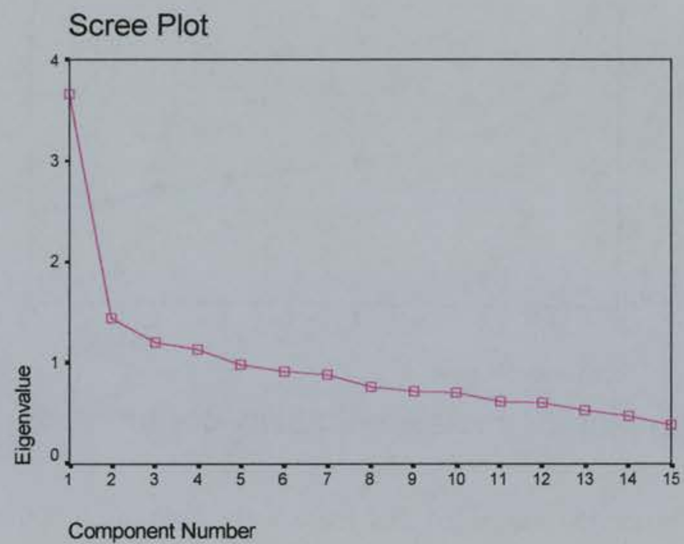


Figure 14 Scree plot for childhood fantasy proneness components

The scree slope (Figure 14) suggested that there was 1 major component, and possibly a second component, to the measure of childhood fantasy proneness that accounted for 33% of the variance (see Table 20). A second component was extracted in the subsequent principal factor analysis because the extraction of one or two additional factors would not affect the analysis too much (Gorsuch, 1983; Kline, 1994). Thus, the results suggested that 2 factors should be extracted in the principal factor analysis.

Table 20 Eigenvalues and percentage of variance for childhood fantasy proneness components

Component	Initial eigenvalue[a]	% of variance
1	3.663	24.421
2	1.435	9.563
3	1.203	8.019
4	1.125	7.503

[a] only eigenvalues greater than 1 are shown

Social desirability

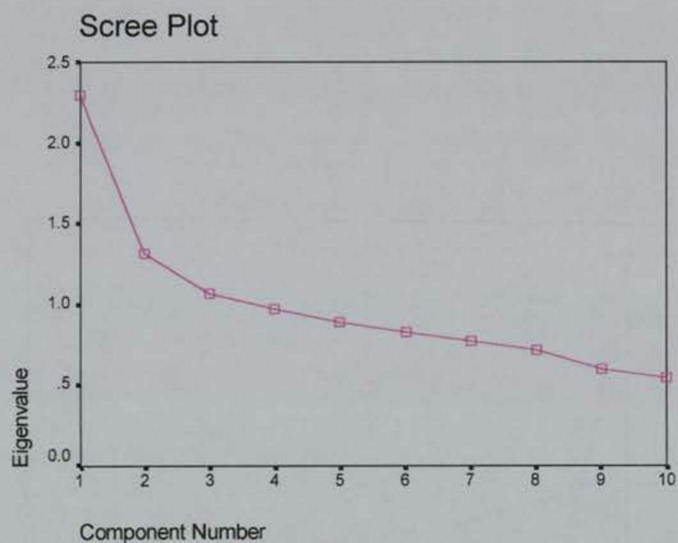


Figure 15 Scree plot for social desirability components

The scree slope (Figure 15) suggested that there were 2 major components to the measure of social desirability that accounted for 36% of the variance (see Table 21). This result suggested that 2 factors should be extracted in the principal factor analysis.

Table 21 Eigenvalues and percentage of variance for social desirability components

Component	Initial eigenvalue[a]	% of variance
1	2.298	22.985
2	1.314	13.144
3	1.066	10.660

[a] only eigenvalues greater than 1 are shown

Principal factors

Principal factor analysis was used for the main analyses because it does not assume that the measures are perfectly reliable (Bryman & Cramer, 1997), an assumption that is rarely true especially in the social sciences (Gorsuch, p. 83, p. 124).

Both orthogonally-rotated (varimax) and obliquely-rotated (direct oblimin) solutions were obtained (as recommended by Kline, 1994) for each measure. Orthogonal solutions produce factors that are independent of one another, i.e., do not correlate with each other. Oblique solutions produce factors which may be related to each other (Kline, 1994).

Orthogonally-rotated solutions

The varimax rotated solutions indicated that there was a correlation of $r = .521$ between factor 1 and factor 2 for the anomalous beliefs scale, $r = .503$ between factor 1 and factor 2 for the childhood-adulthood anomalous experiences scale, $r = .615$ between factor 1 and factor 2, $r = .532$ between factor 1 and factor 3, and $r = .416$ between factor 2 and factor 3 of the childhood sleep-related experiences scale, $r = .589$ between factor 1 and factor 2 of the childhood fantasy scale, and $r = .697$ between factor 1 and factor 2 of the social desirability scale. These findings suggested that an oblique solution would be more appropriate in each case.

Obliquely-rotated solutions

Anomalous beliefs

Table 22 shows that all of the belief items loaded positively on factor 1 and negatively on factor 2. All items loaded greater than .3 (the chosen criterion for acceptance) on factor 1, apart from the déjà vu and the belief in life on other planets item. The déjà vu item did not load sufficiently highly on either factor and should probably not be used. The magnitude of item loadings was greater, on average, on factor 1 than on factor 2. Belief items relating to extra-terrestrials loaded highest on factor 2. The results suggest that the belief items could usefully be divided into two separate factors. Factor 1 would contain all items except the déjà vu and extra-terrestrial items; factor 2 would consist of the four extra-terrestrial items.

Table 22 Structure matrix for anomalous belief items following oblique (oblimin) rotation

Item	Factor	
	1	2
Awareness of deceased person	.748	-.401
Ability to see auras	.731	-.308
Precognition	.726	-.253
General ESP	.717	-.346
DMILS	.711	-.325
Contact spirits of the dead	.707	-.442
Psychokinesis	.694	-.368
Out-of-body experience	.687	-.289
Memories of previous life	.651	-.379
Heal person via mind	.599	-.273
Near-death experience	.593	-.203
Telepathy	.581	-.238
Outbreak of inexplicable noises	.530	-.315
Life after death	.514	-.257
Spiritual, mystical, transcendental experience	.447	-.063
Déjà vu	.294	-.012
Extra-terrestrial communication with Earth	.435	-.905
Extra-terrestrial visitation of Earth	.446	-.898
Extra-terrestrials have allowed humans on board	.411	-.841
Life on other planets	.230	-.646

Table 23 Factor correlation matrix for anomalous beliefs factors

	Factor correlation matrix	
Factor	1	2
1	1.000	-.392
2	-.392	1.000

Table 23 shows that the anomalous belief factors 1 and 2 are significantly and negatively correlated with each other.

Childhood-adulthood anomalous experiences

The structure matrix (see Table 24) shows that all of the childhood-adulthood anomalous experience items loaded greater than the criterion of .3 on factor 1 with the exception of three of the extra-terrestrial items. The majority of the items did not load greater than the criterion on factor 2. Six of the extra-terrestrial items loaded greater than the criterion on factor 2 and their loadings are greater on factor 2 than on factor 1. The results suggest that the childhood-adulthood anomalous experience items could be usefully divided up into two factors: factor one would include all items except for those relating to extra-terrestrial experiences, factor 2 would include items relating to extra-terrestrials.

Table 24 Structure matrix for anomalous experience items following oblique (oblimin) rotation

Item	Factor	
	1	2
Apparition/presence (child)	.685	.139
Apparition/presence (adult)	.681	.149
Psychokinesis (child)	.657	.283
Healing others (child)	.648	.249
Psychokinesis (adult)	.640	.318
Memories of previous life (adult)	.627	.271
Seeing auras (adult)	.620	.329
Waking ESP (adult)	.598	.097
OBE (adult)	.596	.261
Unexplained noises (child)	.596	.174
Dream ESP (adult)	.585	.056
Unexplained noises (adult)	.573	.214
Seeing with eyes closed (adult)	.564	.130
OBE (child)	.561	.202
Waking ESP (child)	.560	.094
Spiritual, mystical, transcendental (adult)	.553	.229
Seeing strange lights/objects in sky (child)	.548	.483
Memories of previous life (child)	.535	.270
Healing others (child)	.532	.336
Dream ESP (child)	.515	.057
Seeing auras (child)	.514	.262
Seeing with eyes closed (child)	.510	.078
Spiritual, mystical, transcendental (child)	.509	.294
Communication with the dead (adult)	.497	.247
Seeing strange lights/objects in sky (adult)	.494	.471
Autoscopic phenomenon (adult)	.484	.352
Being healed by others (adult)	.476	.279
Unexplained bites, scratches, pinches (child)	.458	.247
Unexplained bites, scratches, pinches (adult)	.444	.251
Autoscopic phenomenon (child)	.443	.342
Communication with the dead (child)	.433	.268
Near-death experience (adult)	.426	.424
Being healed by others (child)	.406	.354
Déjà vu (adult)	.382	.009
Déjà vu (child)	.312	-.006
Contact with UFO occupants (child)	.259	.781
Contact with UFO occupants (adult)	.304	.743
Been on board a UFO (adult)	.118	.636
Been on board a UFO (child)	.102	.635
Seen a UFO at close range (child)	.303	.510
Near-death experience (child)	.358	.460
Seen a UFO at close range (adult)	.330	.451

Table 25 Factor correlation matrix for anomalous experience factors

	Factor correlation matrix	
Factor	1	2
1	1.000	.339
2	.339	1.000

Table 25 shows that there is a significant positive correlation between factor 1 and factor 2 of the childhood-adulthood anomalous experience items.

Childhood sleep-related experiences

Table 26 shows that there is a cluster of items loading higher than the criterion of 0.3 on each of factors 1-3. Sleep bruxism and enuresis did not load greater than the criterion on any of the factors. The following childhood symptoms loaded highest on factor 1: sleep terrors, sleep talking, nightmares, REM sleep behaviour disorder, sleepwalking, confusional arousals, nocturnal leg cramps, excessive sleepiness, false awakenings (Type 2)*, cataplexy, sleep starts*, sleep choking*, rhythmic movement disorder, snoring, and dream recall*. Variables marked with '*' loaded greater than 0.3 on more than one factor but with a similar magnitude.

The following items loaded highest and negatively on factor 2: prelucid dreams, lucid dreams, dream control 1, dream control 2, falling dreams, flying dreams, vivid dreams, false awakenings (Type 1), false awakenings (Type 2)*, dream recall*.

The following items loaded highest and negatively on factor 3: hypnagogic imagery, hypnopompic imagery, exploding head symptoms, pre-dormital sleep paralysis, post-dormital sleep paralysis, sleep starts*, and sleep choking*.

The results suggest that the childhood sleep-related experience items could be usefully divided up into three factors. Items that loaded greater than the criterion with a similar magnitude on more than one factor were allocated to the factor that seemed most appropriate at face value and according to expectations.

Table 26 Structure matrix for childhood sleep-related experience items following oblique (oblimin) rotation

	Factor 1	Factor 2	Factor 3
Sleep terrors	.720	-.286	-.419
Sleep talking	.654	-.291	-.260
Nightmares	.570	-.337	-.232
REM sleep behaviour disorder	.558	-.179	-.342
Sleepwalking	.510	-.201	-.218
Confusional arousals	.495	-.354	-.127
Nocturnal leg cramps	.491	-.220	-.281
False awakenings (Type 2)	.481	-.457	-.421
Excessive sleepiness	.453	-.280	-.246
Cataplexy	.425	-.137	-.369
Sleep starts	.408	-.166	-.341
Sleep choking	.355	-.151	-.342
Rhythmic movement disorder	.352	-.109	-.296
Primary snoring	.338	-.229	-.146
Dream recall	.337	-.321	-.006
Sleep bruxism	.300	-.105	-.248
Lucid dreams	.298	-.768	-.304
Dream control 1	.271	-.725	-.047
Dream control 2	.324	-.689	-.188
Prelucid dreams	.377	-.676	-.340
Flying dreams	.298	-.541	-.240
False awakenings (Type 1)	.462	-.537	-.266
Falling dreams	.483	-.492	-.273
Vivid dreams	.425	-.492	-.142
Pre-dormital sleep paralysis	.353	-.254	-.743
Hypnopompic imagery	.403	-.248	-.629
Post-dormital sleep paralysis	.293	-.209	-.543
Exploding head symptoms	.332	-.238	-.535
Hypnagogic imagery	.373	-.251	-.467
Sleep enuresis	.163	-.114	-.185

Factor 1 would consist of the following childhood sleep disorder symptoms: sleep terrors, sleep talking, nightmares, REM sleep behaviour disorder, sleepwalking, confusional arousals, nocturnal leg cramps, excessive sleepiness, cataplexy, rhythmic movement disorder, primary snoring.

Factor 2 would consist of the following childhood dream items: prelucid dreams, lucid dreams, dream control 1, dream control 2, falling dreams, flying dreams, vivid dreams, false awakenings (Type 1), false awakenings (Type 2), dream recall.

Factor 3 would consist of the following childhood hypnagogic/ hypnopompic items: hypnagogic imagery, hypnopompic imagery, exploding head symptoms, pre-dormital sleep paralysis, post-dormital sleep paralysis, sleep starts, and sleep choking.

Table 27 Factor correlation matrix for childhood sleep-related experience factors

	Factor correlation matrix		
Factor	1	2	3
1	1.000	-.449	-.458
2	-.449	1.000	.215
3	-.458	.215	1.000

Table 27 shows that the childhood sleep-related factor 1 is significantly negatively correlated with factors 2 and 3; factor 2 is significantly positively correlated with factor 3.

Childhood fantasy proneness

The structure matrix (see Table 28) shows that all of the childhood fantasy proneness items loaded positively and greater than the criterion of .3 on factor 1, with the exception of items 3-6. Items 1, 3, 4, 6, 7, 8, 11 loaded positively and greater than the criterion on factor 2. Items 1, 4, 7, 8, 11 loaded greater than the criterion on both factors. Item 5 did not load greater than the criterion on either factor. The results suggest that the childhood fantasy proneness items yield only one factor that can be used; the second factor has too few items and may consist of bloated specifics. Factor 1 would consist of items 1, 2, 7-15. There is a positive correlation between the two factors.

Table 28 Structure matrix for childhood fantasy proneness items following oblique (oblimin) rotation

Item	Factor 1	Factor 2
Item 7	.642	.451
Item 8	.632	.308
Item 15	.590	.064
Item 14	.587	.260
Item 13	.457	.157
Item 11	.445	.442
Item 10	.392	.150
Item 12	.380	.211
Item 9	.359	.061
Item 2	.316	.211
Item 5	.191	-.114
Item 3	.082	.496
Item 6	.221	.486
Item 1	.312	.472
Item 4	.208	.340

Table 29 Factor correlation matrix for childhood fantasy proneness factors

Factor	Factor correlation matrix 1	2
1	1.000	.289
2	.289	1.000

Social desirability

Table 30 shows that six out of the ten social desirability items loaded greater than the criterion of .3 on factor 1 with the exception of True 1-4. True 1, 3, 4 loaded negatively and greater than the criterion on factor 2. False 3 also loaded negatively on factor 2. The results suggest that the social desirability items yield only one factor that can be used; the second factor has too few items.

Table 30 Structure matrix for social desirability items following oblique (oblimin) rotation

Item	Factor 1	Factor 2
False 3	.517	-.307
False 4	.459	-.071
False 2	.441	-.173
False 5	.415	-.121
False 1	.343	-.225
True 5	.301	-.256
True 2	.256	-.248
True 3	.297	-.595
True 1	.181	-.521
True 4	.166	-.506

Table 31 Factor correlation matrix for social desirability factors

	Factor correlation matrix	
Factor	1	2
1	1.000	-.391
2	-.391	1.000

Reliability of proposed new scales

Item-total correlations and alpha coefficients of reliability were calculated for each proposed new scale. The aim was to select only those items for the final version of the new scales that had an item-total correlation greater than or equal to 0.3.

Anomalous beliefs scales

All 15 and 4 items for factors 1 and 2, respectively, met the item-total correlation criterion. The alpha coefficients of reliability, r = .91 and r = .90, were greater than the desired criterion value.

Childhood and adulthood anomalous experiences scales

All 17 and 4 items for factors 1 and 2, respectively, of the childhood anomalous experience scales met the item-total correlation criterion. The alpha coefficient of reliability for factor 1, r = .87, was greater than the desired criterion value; the alpha coefficient for factor 2, r = .62, was slightly below the desired value.

All 17 items for factor 1 of the adulthood anomalous experience scale met the item-total correlation criterion. The alpha coefficient of reliability for factor 1, r = .89, was greater than the desired criterion value; the alpha coefficient for factor 2, r = .60, was slightly below the desired value. The alpha coefficient with the having been on board a UFO (adult) item deleted (item-total correlation .262) was r = .63. This item was kept in the scale in order to maintain similarity with the childhood version and because its exclusion made little difference to the internal reliability of the scale.

Childhood sleep-related experience scales

Ten of the 11 items for factor 1 (sleep disorder symptoms) met the item-total correlation criterion; the snoring item, r = .286, did not and was excluded. The alpha coefficient of reliability for factor 1 with this item deleted was r = .79 which was greater than the desired criterion value.

Nine of the 10 items for factor 2 (dream variables) met the item-total correlation criterion; the dream recall item, r = .294, did not and was excluded. The alpha coefficient of reliability for factor 2 with this item deleted was r = .85 which was greater than the desired criterion value.

Six of the 7 items for factor 3 (HG/HP variables) met the item-total correlation criterion; the sleep choking item, r = .266, did not and was excluded. The exploding head item was also excluded because its inadvertent double-barrelled nature meant that it did not reliably measure the frequency of exploding head symptoms. The alpha coefficient of reliability for factor 3 with these items deleted was r = .70 which was the desired minimum criterion value.

Childhood fantasy proneness scale

Nine of the 11 items for factor 1 met the item-total correlation criterion; items 2 ($r = .271$) and 9 ($r = .286$) did not and were excluded. The alpha coefficient of reliability for factor 1 with these items deleted was $r = .76$ which was greater than the desired criterion value.

Social desirability scale

Seven of the 10 items did not meet the item-total correlation criterion. The alpha coefficient of reliability, $r = .62$, was below the desired criterion value.

Discussion

The results of the factor analysis suggest that belief in anomalous phenomena is a multi-dimensional construct (Clarke, 1991; Gallagher et al., 1994; Grimmer & White, 1990; Irwin, 1993a; Lawrence, 1995a, 1995b, 1998; Sobal & Emmons, 1982; Sparks et al., 1997; Thalbourne & Delin, 1993; Tobacyk, 1995a, 1995b) and that belief in non-extra-terrestrial phenomena is not necessarily associated with equally strong belief in extra-terrestrial phenomena. In fact in this case, stronger belief in non-extra-terrestrial phenomena is associated with weaker belief in extra-terrestrial phenomena. This finding supports the suggestion by some researchers (e.g., Irwin, 1994a; Lawrence, 1995a) that extra-terrestrial and UFO phenomena should not be considered to be paranormal or parapsychological. However, other researchers have suggested that belief in extraordinary life forms is one dimension of paranormal belief (Clarke, 1991; Tobacyk, 1988; Tobacyk & Milford, 1983). However, Tobacyk (1995b) has more recently acknowledged that such life forms are not strictly paranormal.

There is disagreement over the actual number of dimensions underlying paranormal belief, even within the same measure (Lawrence, 1995a, 1995b; Lawrence & De Cicco, 1997; Lawrence et al., 1997, 1998; Tobacyk, 1995a, 1995b). This is not at all surprising in view of the disagreement and uncertainty concerning the definition and breadth of the constructs. This will inevitably affect the range of items included in a given measure and will also impact on the type and number of possible factors that can come out of a factor analysis (Irwin, 1993a).

The anomalous experiences finding is welcome as it suggests that the structure of the anomalous experience measure is similar to that for the anomalous beliefs measure, which is what one would hope. Previous research has also suggested that paranormal experience is a multi-dimensional construct (Richards, 1990; Ross & Joshi, 1992). However, contrary to the structure of the beliefs measure, there is a significant positive relationship between the factors. One possible explanation for this may be that there is an underlying variable that is conducive to both kinds of experience.

The three childhood factors identified by the factor analysis, sleep disorders symptoms, dream experiences, and hypnagogic/hypnopompic experiences, seem to have good face and content validity. However, one must note the dangers of interpreting factors based only on factor loadings; this is not sufficient (Kline, 1994). One must use cross-validation, either with new samples or by splitting the original data set and/or the factors must be validated against external criteria (Gorsuch, 1983; Hair et al., 1998).

Chapter 9 will demonstrate how these revised measures (non-UFO- and UFO-related anomalous experience and belief measures, childhood hypnagogic/hypnopompic, dream and sleep disorder symptoms and modified childhood fantasy proneness) will be incorporated into the proposed model, which will then be tested using structural equation modelling (SEM) techniques.

Chapter 9

Test of proposed models using structural equation modelling (SEM) and WWW survey data

This chapter will outline the SEM procedure used to test the competing models (see Chapter 3) that have been proposed as part of this thesis, using the combined data from WWW surveys 1 and 2.

Preliminary examination of data

A preliminary examination of the data is important, particularly for multivariate analyses such as SEM (Schumacker & Lomax, 1996; Tabachnik & Fidell, 1996). It is a good idea to inspect a correlation matrix for the variables that will feature in the model(s) to be tested. One should also check the number of cases to see how much missing data there is and how many cases are deemed to be valid for inclusion in the analysis. One should also check for outliers and univariate and multivariate normality as these can lead to spurious results..

The two most commonly used model estimation techniques, maximum likelihood (ML) and normal theory generalized least squares (GLS) both assume that: (1) a large sample will be used; (2) the observed variables are continuous; (3) the measured variables have a multivariate normal distribution; (4) the model estimated is a valid one (West, Finch, & Curran, 1995). In practice, these assumptions are not always met and, if this is the case, one must take appropriate steps, such as using robust parameter estimation techniques, to ensure that the results can still be trusted (West et al., 1995).

The SEM analyses were all carried out using the EQS for Windows Version 4.04 computer software (Bentler & Wu, 1993).

a) Inspection of bivariate correlation matrix

A Pearson's correlation matrix (for the complete sample N = 229) was calculated (using SPSS for Windows). This was examined to see if there was bivariate support for the proposed paths in the models and to look for possible multi-collinearity and singularity problems among the variables that might lead to problems with testing the proposed models. Whilst it is recognised that the subsequent SEM analysis was to be carried out on the covariance matrix and not the correlation matrix, the correlation matrix is standardised (Pearson's $r = \text{covariance}_{xy} / s_x s_y$) and is thus easier to interpret, though it is only a rough guide (Ullman, 1996).

The covariance matrix was chosen as the input for the SEM because the purpose of the SEM was to test the proposed models rather than to try to confirm existing models; for such purposes, a covariance matrix is considered to be the most appropriate form of input as this is the kind of input that SEM was designed to utilise (Neill et al., 1999, p. 171).

Table 32 shows that, as expected, there were significant positive correlations among the childhood fantasy proneness, HG/HP experience, dream experience and sleep disorders measures. As hypothesised, these variables were nearly all significantly positively correlated with the childhood and adulthood incidence of both non-UFO-related and UFO-related anomalous experiences (with the exception of childhood fantasy proneness and adult UFO-related experiences). The childhood and adulthood anomalous experience variables were also significantly positively correlated with each other and also with the current level of non-UFO-related and UFO-related anomalous beliefs. There was also a significant positive correlation between the current level of both non-UFO-related and UFO-related anomalous beliefs.

Table 32 Sample correlation matrix

	FP	HGHP	DREAM	DISORDER	CHILD AE1	CHILD AE2	ADULT AE1	ADULT AE2	BELIEF1	BELIEF2
FP	----									
HGHP	.176**	----								
DREAM	.316**	.430**	----							
DISORDER	.324**	.508**	.502**	----						
CHILD AE1	.276**	.569**	.407**	.501**	----					
CHILD AE2	.133*	.274**	.197**	.180**	.495**	----				
ADULT AE1	.265**	.481**	.357**	.415**	.744**	.451**	----			
ADULT AE2	.080	.276**	.221**	.113	.439**	.700**	.488**	----		
BELIEF1	.122	.164*	.029	.081	.329**	.201**	.516**	.249**	----	
BELIEF2	.004	.083	.014	.045	.211**	.214**	.238**	.239**	.494**	----

* p< .05, ** p< .01, two-tailed

Closer examination of the correlation matrix indicated that there were large correlations between the childhood and adulthood anomalous experience AE1 (non-UFO-related) measures (r = .744**) and between the childhood and adulthood anomalous experience AE2 (UFO-related) measures (r = .700**). Because there was almost 50% common variance between these pairs of measures it was decided that this might lead to multi-collinearity problems and it was probably safer to create a composite score from the redundant variables (Tabachnik & Fidell, 1996, pp-84-86). The means of the childhood and adulthood variables were calculated in order to produce new overall AE1 and AE2 variables e.g., AE1= (CHILDAE1 + ADULTAE1)/2. These new variables were used in all subsequent analyses.

b) sample size and missing data

Approximately 100-150 cases are considered to be a minimum for SEM (Ding, Velicer, & Harlow, 1995). In addition, although maximum likelihood estimation (MLE) methods can provide valid results with sample sizes of around 50, a sample size of at least 100-150 is recommended if MLE is to be used (Hair et al., 1998, p. 605).

Initially, there were 229 cases in the sample but only 213 cases were included in the final analysis. Twelve cases containing univariate outliers and four further cases, identified by EQS as making some of the largest contributions to multivariate kurtosis, were excluded.

Bentler and Chou (1987) recommend that five participants per variable is sufficient for normal and elliptical distributions, and 10 per variable for other distributions. With 213 participants and eight variables, the ratio is over 26:1.

c) level of measurement

If ordinal, rather than continuous interval, measures are used in SEM it is possible that the relationships among them may be attenuated, particularly if the number of possible values of the variables is fewer than five (West et al., 1995). Although the childhood fantasy proneness and anomalous beliefs items have fewer than five scale points, the overall mean value for a number of items is used in the SEM analysis. If there are at least 20 possible values of an ordinal variable, then it has been argued that this provides an acceptable approximation to an interval measure (Clark-Carter, 1997, p. 204).

d) outliers

The EQS software identified twelve cases containing univariate outliers (> 3 SDs from the means) which were excluded from further analysis.

e) normality of sampling distributions

Most of the SEM estimation techniques assume that there is multivariate normality (Neill et al., 1999; Ullman, 1996) so it is obviously important to assess this prior to analysis (Breckler, 1990). Examination of Mardia's normalised estimate of multivariate kurtosis (= 2.95) indicated that it was significantly higher than the standardised mean. Therefore, four cases, which were making some of the largest contributions to this estimate, were also excluded from the analysis. With the exclusion of these cases, Mardia's normalised estimate of multivariate kurtosis was reduced to 1.53, which was considered to be more acceptable. Because the variables did not meet ideal requirements in terms of univariate and multivariate normality, a decision was made to use the Satorra-Bentler Scaled chi-square test statistic because it performs well when the variables are not normally-distributed or if there is dependence among factors and errors (Bentler, 1993; Ullman, 1996; West et al., 1995).

Test of the proposed models

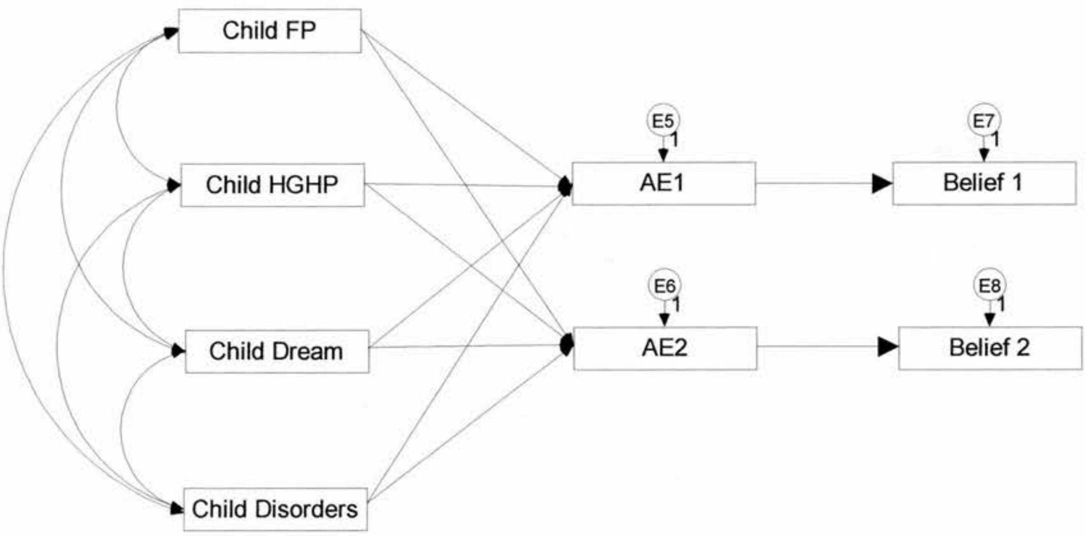
Model specification

The models that were originally postulated in Chapter 3 have been modified. The results of the factor analysis of the measures suggested that the childhood sleep-related experiences should be split into three factors (childhood HG/HP, dream, sleep disorder symptoms) and that the anomalous experience and anomalous belief measures should be split into non-UFO- and UFO-related experiences and beliefs. Inspection of the bivariate correlation matrix raised concerns over potential multi-collinearity problems due to the large correlations between childhood and adulthood measures of anomalous experiences; this resulted in composite childhood/adulthood measures of non-UFO- and UFO-related anomalous experiences being devised instead.

Note that in all of the models:

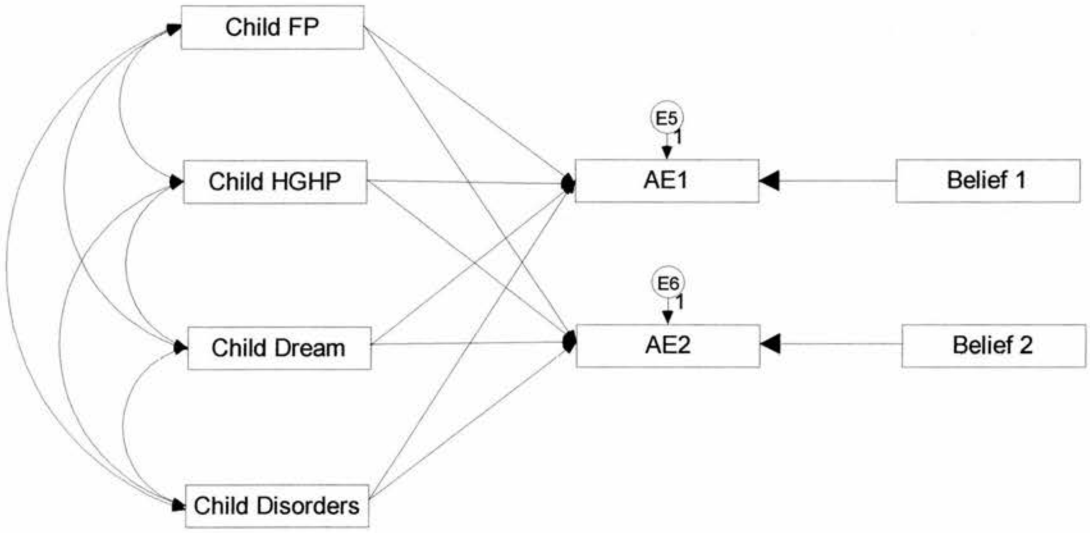
Child FP	=	a measure of childhood fantasy proneness
Child HGHP	=	a measure of childhood HG/HP experiences
Child Dream	=	a measure of childhood dream experiences
Child Disorders	=	a measure of childhood sleep disorder symptoms
AE1	=	a measure of non-UFO-related anomalous experiences
AE2	=	a measure of UFO-related anomalous experiences
Belief1	=	a measure of non-UFO-related anomalous beliefs
Belief2	=	a measure of UFO-related anomalous beliefs

Figure 16 Sherwood's experiential source model of childhood antecedents of anomalous experiences and beliefs



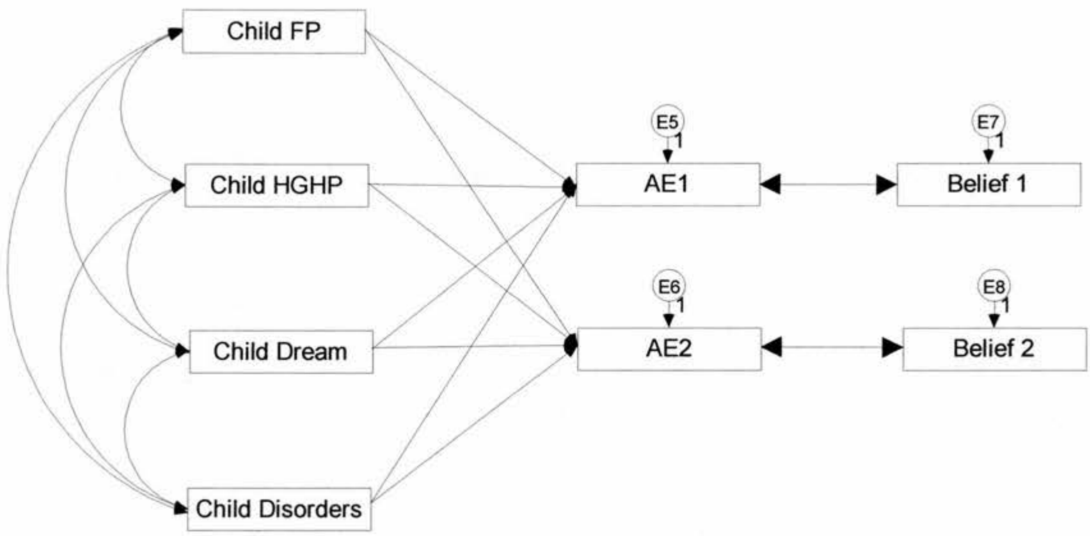
The key aspect of the experiential source model is that it proposes that anomalous experiences are the cause of associated anomalous beliefs. The experiential source model proposes that there will be significant positive relationships among the level of childhood fantasy proneness and the childhood hypnagogic/hypnopompic, dream and sleep disorder symptoms variables. The model also proposes that each of the aforementioned variables will have a direct positive relationship with the incidence of both non-UFO-related and UFO-related anomalous experiences, i.e., as each childhood variable increases, the incidences of non-UFO-related and UFO-related anomalous experiences will also increase. It also proposes that the incidence of each measure of anomalous experiences will have a direct positive relationship with the current level of corresponding beliefs, i.e., as the incidence of anomalous experiences increases, the corresponding level of beliefs will also increase. Thus, it is hypothesised that the childhood variables will only have indirect relationships with the current levels of anomalous beliefs via their relationships with the incidences of anomalous experiences.

Figure 17 Sherwood's cognitive source model of childhood antecedents of anomalous experiences and beliefs



The cognitive source model is basically the same as the experiential source model except that the anomalous beliefs are posited to be the cause of rather than the consequence of their respective anomalous experiences.

Figure 18 Sherwood's reciprocal causation model of childhood antecedents of anomalous experiences and beliefs



The reciprocal causation model is really a hybrid of the experiential and cognitive source models in that it proposes that anomalous experiences can cause anomalous beliefs and vice versa.

Model identification

There are more data points than parameters to be estimated and so the models are all overidentified (see Chou & Bentler, 1995; Ullman, 1996).

Estimation of parameters

The Maximum Likelihood method of estimation was chosen, as this is the one most frequently used in SEM and because it performs well under less-than-optimal conditions (Hoyle & Panter, 1995). The univariate and multivariate deviations from normality meant that it was prudent to obtain Satorra-Bentler Scaled chi-square estimates of model fit along with robust standard errors. This was specified in the METHODS= ML, ROBUST; section of the EQS command file.

Table 33 Sample covariance matrix

	FP	HGHP	DREAM	DISORDER	AE1	AE2	BELIEF1	BELIEF2
MEAN	3.502	2.795	3.133	2.636	1.937	1.151	1.575	1.304
SD	2.447	0.990	0.952	0.806	0.575	0.227	0.358	0.504
FP	5.987							
HGHP	0.521	0.980						
DREAM	0.795	0.364	0.907					
DISORDER	0.735	0.396	0.394	0.649				
AE1	0.468	0.303	0.218	0.223	0.331			
AE2	0.090	0.050	0.034	0.035	0.060	0.051		
BELIEF1	0.147	0.047	0.015	0.012	0.089	0.013	0.128	
BELIEF2	0.033	0.015	- 0.008	- 0.001	0.050	0.017	0.082	0.254

The determinant of the input sample covariance matrix = 0.249×10^{-3}.

Testing of model fit

Test of the experiential source model

EQS provided the following satisfactory message "PARAMETER ESTIMATES APPEAR IN ORDER, NO SPECIAL PROBLEMS WERE ENCOUNTERED DURING OPTIMIZATION."

a) residuals

An examination of the residual covariance matrix found that the residuals were generally very small (average off-diagonal absolute standardised residuals = 0.0524) and symmetrically-distributed (see Ullman, 1996).

The largest standardised residuals indicate that the relationships between non-UFO-related and UFO-related anomalous beliefs (residual = 0.446) and between non-UFO-related and UFO-related anomalous experiences (residual = 0.298) are not explained adequately by the proposed model. Such large residuals can lead to a lack of overall fit for a model (Bentler, 1993, p. 91). Standardised residuals greater than 0.4 indicate that some of the relationships are not being explained very well at all by the model (Hu & Bentler, 1995).

b) model chi-square

Table 34 Measures of fit for the experiential source model

Measures of fit	Value	df	p
Independence model χ^2	431.812	28	$p < .001$
Model χ^2	97.511	12	$p < .001$
Satorra-Bentler Scaled χ^2	100.823	12	$p < .00001$
χ^2 difference test	334.301	16	$p < .001$
χ^2 difference test (Scaled)	330.989	16	$p < .001$
Bentler-Bonett Normed Fit Index (NFI)	0.774		
Bentler-Bonett Non-normed Fit Index (NNFI)	0.506		
Comparative Fit Index (CFI)	0.788		

The independence model chi-square value (see Table 34) indicated that, as expected, there were significant relationships among the variables in the model. The chi-square difference tests indicated that the hypothesised model provided a significant improvement in fit compared to the independence model. However, the model chi-square value showed that there was a significant difference between the data and the proposed model which means that the model does not fit the data. The Satorra-Bentler Scaled chi-square value was also significant and did not support the proposed model. Three different indices of fit,[14] which were all smaller than 0.9, also suggested that the proposed model did not provide a sufficiently good fit to the data (Hoyle & Panter, 1995).

Respecification of the experiential source model

Lawrence (personal communication, May 28, 1998) suggested that the proposed model should allow for covariation between the residual error variables for the anomalous experience variables and also between the residual error variables for the anomalous beliefs variables. This is because the largest standardised residuals were for the anomalous beliefs and anomalous experience variables' covariances. If the variables themselves are related, and only a small proportion of the variance in each of these variables is accounted for by the independent variables, then it is possible that the error terms (which reflect the amount of unexplained variance) may also be related. Any relationships between the error terms for the anomalous experience or belief variables could be due to the fact that another IV(s), which was not specified in the model and/or measurement error, accounts for the unexplained variances.

Thus, the proposed model was revised and covariances between the non-UFO-related and UFO-related anomalous experience variable error terms (E5 and E6) and between the non-UFO-related and UFO-related anomalous beliefs error terms (E7 and E8) were added.

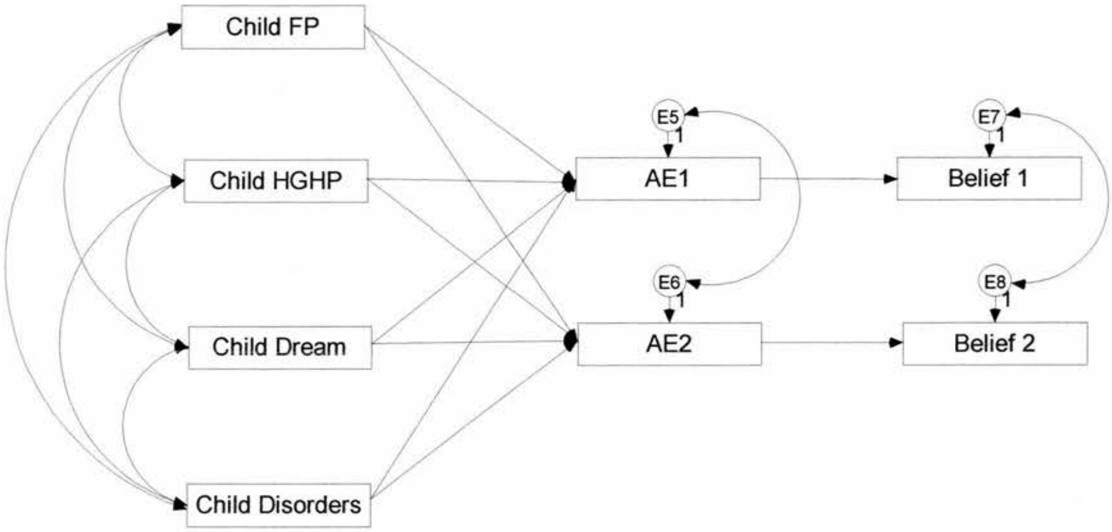


Figure 19 Diagram of the revised experiential source model

[14] The use of more than one adjunct index of fit is recommended (e.g., Hoyle, 1995).

Testing of model fit

a) residuals

An examination of the residual covariance matrix found that they were generally much smaller than before (average off-diagonal absolute standardised residuals = 0.0234) and symmetrically-distributed, which is indicative of a better fit than the previous version of the model. Only three residuals had an absolute magnitude greater than 0.1.

b) model chi-square

This time the model chi-square value indicated that there was no significant difference between the data and the proposed model, which is therefore supportive of the model. The Satorra-Bentler Scaled chi-square value is also non-significant and supportive of the proposed model.[15] However, the finding that both chi-square values are approaching significance suggests that improvements to the model might provide a better fit to the data. Indices of fit were greater than 0.9 which also suggests that the proposed model provides a good fit to the data.

Table 35 Measures of fit for the revised experiential source model

Measures of fit	Value	df	*p*
Independence model chi-square value	431.812	28	$p < .001$
Model chi-square value	17.671	10	$p = 0.061$
Satorra-Bentler Scaled chi-square value	18.197	10	$p = 0.052$
χ^2 difference test	414.141	18	$p < .001$
χ^2 difference test (Scaled)	413.615	18	$p < .001$
Bentler-Bonett Normed Fit Index (NFI)	0.959		
Bentler-Bonett Non-normed Fit Index (NNFI)	0.947		
Comparative Fit Index (CFI)	0.981		

[15] A useful rule of thumb suggests that a good-fitting model may be indicated when the ratio of χ^2 to the degrees of freedom is less than 2 (Ullman, 1996, p. 748); in this case the ratios are both less than 1.82.

Post-hoc analyses

i) Lagrange multiplier test

The Lagrange multiplier test (for adding parameters) suggested adding a path between childhood sleep disorders and non-UFO-related anomalous beliefs (multivariate χ^2 (1, N=213) = 7.25, $p < .01$). Note that with the Lagrange multiplier test one is looking for a significant χ^2 value as an indicator of potential improvement to the model fit. As post-hoc tests can take advantage of chance or idiosyncratic features of the data (MacCallum, 1995), a conservative criterion of $p < .01$ for accepting suggested additions was adopted (Ullman, 1996).

The Lagrange multiplier test also suggested adding seven other paths (including direct paths between childhood fantasy proneness and the anomalous beliefs measures) but none of these were estimated to make a significant improvement to the model fit. For this reason, there was no point in testing a modified version of the experiential source model with additional direct links between fantasy proneness and anomalous beliefs, as proposed by Irwin (1992, 1993a).

Thus, the results of the SEM analysis do support an albeit slightly modified version of the experiential source model of the childhood antecedents of anomalous beliefs. There is no support for direct paths between childhood fantasy proneness and measures of anomalous beliefs.

ii) Wald test

The Wald test (for dropping parameters) suggested the removal of the paths between the childhood dream and UFO-related anomalous experiences measures (multivariate χ^2 (1, N=213) = 0.163, $p = 0.686$), the childhood sleep disorders and UFO-related anomalous experiences measures (multivariate χ^2 (2, N=213) = 0.845, $p = 0.655$), the childhood dream and non-UFO-related anomalous experiences measures (multivariate χ^2 (3, N=213) = 3.709, $p = 0.295$), and between the childhood fantasy proneness and UFO-related anomalous experiences measures (multivariate χ^2 (4, N=213) = 7.395, $p = 0.116$). Note that with the Wald test one is looking for a nonsignificant χ^2 value as this means that deletion of that particular path will not lead to a significant decrease in the fit of the model.

Table 36 Measures of fit for the revised experiential source model with and without suggested modifications

Post hoc modification	Model χ^2	Satorra-Bentler Scaled χ^2	Bentler-Bonett NFI	Bentler-Bonett NNFI	CFI
Model prior to Lagrange and Wald suggested modifications	17.671 df = 10 $p = 0.061$	18.197 df = 10 $p = 0.052$	0.959	0.947	0.981
Addition Childhood sleep disorders to non-UFO-related anomalous beliefs	10.222 df = 9 $p = 0.333$	10.211 df = 9 $p = 0.334$	0.976	0.991	0.997
Deletion Childhood dream experience to UFO-related anomalous experiences	10.410 df = 10 $p = 0.405$	10.239 df = 10 $p = 0.420$	0.976	0.997	0.999
Deletion Childhood sleep disorders to UFO-related anomalous experiences	11.223 df = 11 $p = 0.425$	11.006 df = 11 $p = 0.443$	0.974	0.999	0.999
Deletion Childhood dream experience to non-UFO-related anomalous experiences	13.995 df = 12 $p = 0.301$	13.848 df = 12 $p = 0.311$	0.968	0.988	0.995
Deletion Childhood fantasy proneness to UFO-related anomalous experiences	17.111 df = 13 $p = 0.194$	16.925 df = 13 $p = 0.203$	0.960	0.978	0.990

iii) Results of suggested modifications

When making post hoc modifications to models, Schumacker & Lomax (1996) recommend changing only a single parameter at a time. Because the order in which parameters are altered can affect the significance of the remaining parameters, MacCallum's (1986) recommendation of adding all suggested free parameters before dropping some was followed.

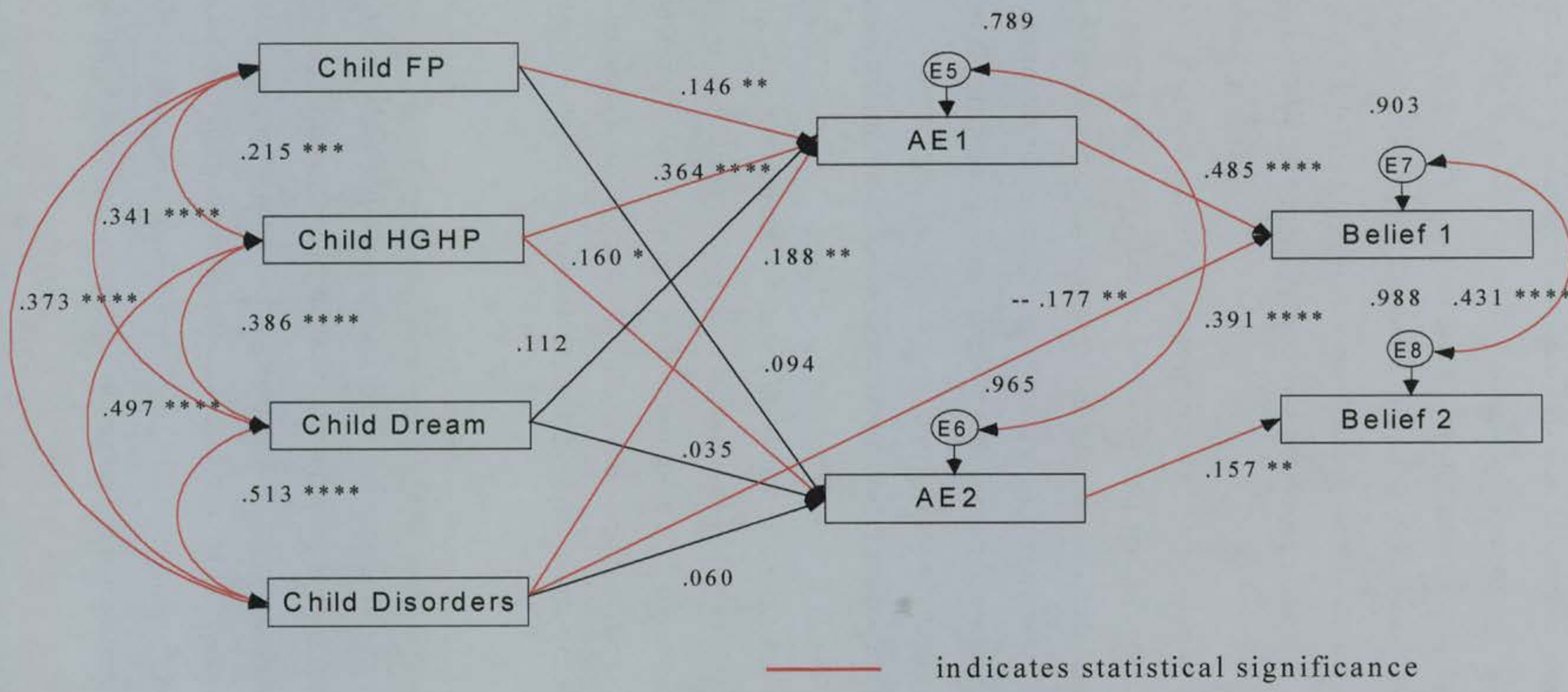
Table 36 shows that the addition of a direct path between the childhood sleep disorders variable and the current level of UFO-related anomalous beliefs provided a much better fit to the data. This is indicated by the clearly non-significant model χ^2 values and the increases in the indices of fit. However, the deletion of the paths suggested by the Wald test did not improve the fit to a great extent. In order to minimise capitalisation of idiosyncrasies in the sample and modifying the model to fit the data, the suggested deletions were not incorporated into the final solution.

Table 37 Values of path coefficients for the final experiential source model

Path	Unstandardised path coefficient (standardised)	Robust standard error	Robust z score	p value[1]
Child FP-AE1	.034 (.146)	.014	2.44	.0073
Child HG/HP-AE1	.211 (.364)	.044	4.78	< .00002
Child dream-AE1	.067 (.112)	.041	1.64	.0505
Child disorders-AE1	.134 (.188)	.052	2.61	.0045
Child FP-AE2	.009 (.094)	.007	1.29	.0985
Child HG/HP-AE2	.037 (.160)	.019	1.94	.0262
Child dream-AE2	.008 (.035)	.020	0.40	.3446
Child disorders-AE2	.017 (.060)	.023	0.74	.2296
AE1-Belief1	.296 (.485)	.039	7.60	< .00002
Child disorders-Belief1	- .077 (- .177)	.026	-2.93	.0034 (two-tailed)
AE2-Belief2	.350 (.157)	.150	2.33	.0099
Path	**Covariance (correlation)**	**Robust standard error**	**Robust z score**	**p value**
Child FP-HG/HP	.521 (.215)	.168	3.10	.00097
Child FP-dream	.795 (.341)	.160	4.96	< .00002
Child FP-disorders	.735 (.373)	.127	5.78	< .00002
Child HG/HP-dream	.364 (.386)	.067	5.41	< .00002
Child HG/HP-disorders	.396 (.497)	.061	6.46	< .00002
Child dream-disorders	.394 (.513)	.060	6.57	< .00002
E5-E6	.039 (.391)	.008	5.05	< .00002
E7-E8	.068 (.431)	.011	6.39	< .00002

[1] *p* values associated with z scores are taken from Table A14:1 in Clark-Carter (1997, p. 566).

Figure 20 Diagram of the results of the SEM for the final version of the experiential source model



Associations

Figure 20 shows that, as predicted, there were significant positive correlations among the childhood fantasy proneness, hypnagogic/hypnopompic, dream and sleep disorder symptoms variables with small to medium effect sizes (.215-.513). There were also significant positive correlations between the residual errors for the anomalous experience (.391) and anomalous belief measures (.431); these suggest that there are other variables, not included in the model, that might influence both of these variables.

Direct relationships

As predicted, childhood fantasy proneness, hypnagogic/hypnopompic experiences and sleep disorder symptoms were significant predictors (one-tailed) of the incidence of non-UFO-related anomalous experiences with standardised path coefficients ranging from 0.146 to 0.364. The magnitude of these relationships is rather small with childhood HG/HP experiences being the most important of these predictors by far. As the level or incidence of these childhood variables increases, the overall incidence of non-UFO-related anomalous experiences also increases. The childhood dream experiences measure did predict the incidence of non-UFO-related anomalous experiences in the hypothesised direction but to a very small extent which was nonetheless approaching significance ($p = 0.0505$). Only the childhood hypnagogic/hypnopompic experience measure was a significant direct predictor of the incidence of UFO-related anomalous experiences, although the magnitude of the path coefficient was smaller (0.160) than for the path to the non-UFO-related anomalous experiences measure (0.364).

It is estimated that the childhood predictors accounted for approximately 38% of the variance in the non-UFO-related anomalous experiences measure but only about 7% of the variance in the UFO-related anomalous experiences measure. This is only approximate as it does not take the correlations between the residual errors into account. Clearly, these childhood variables can account for a sizeable proportion of the variance in the non-UFO-related anomalous experiences measure but they are not very useful when it comes to predicting variance in the UFO-related anomalous experiences measure.

As predicted, the non-UFO-related and UFO-related anomalous experiences measures were significant positive predictors of their respective beliefs. As the overall incidence of non-UFO-related anomalous experiences increases, the belief in such phenomena also increases; a similar relationship held for the UFO-related anomalous experiences and beliefs. Although the magnitude of the path coefficient between the UFO-related anomalous experiences and beliefs measures was small (0.157), the path coefficient between the non-UFO-related measures was quite large (0.485). These findings provide support for the experiential source basis for anomalous beliefs, particularly where non-UFO-related phenomena are concerned.

Post hoc modifications to the original model revealed that the incidence of childhood sleep disorders symptoms was a significant negative predictor (two-tailed) of the level of adult belief in non-UFO-related anomalous phenomena. This means that people who experienced more sleep disorder symptoms during their childhood tend to report lower levels of non-UFO-related anomalous beliefs during adulthood, regardless of whether or not they have ever experienced such anomalous experiences.

It is estimated that the predictors accounted for only 18% of the variance in the level of adult belief in non-UFO-related phenomena and only 2% of the variance in the level of UFO-related beliefs. Again these are only rough estimates as they do not take into account the correlations between the residual variances.

Clearly, this experiential source model is not very good at all at predicting UFO-related experiences and beliefs but it is quite good at predicting non-UFO-related experiences and beliefs.

Indirect relationships

The childhood fantasy proneness, hypnagogic/hypnopompic experience and sleep disorders symptoms measures were also indirect predictors of non-UFO-related anomalous beliefs via their association with the incidence of non-UFO-related anomalous experiences. The childhood HG/HP experiences measure was also an indirect predictor of UFO-related anomalous beliefs via its relationship with UFO-related anomalous experiences.

Test of the cognitive source model

Model specification

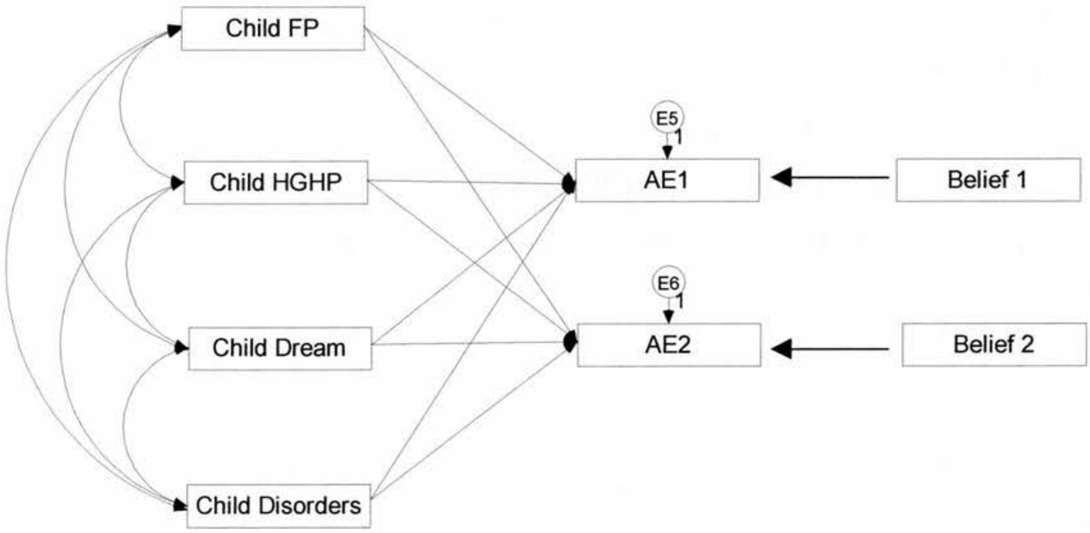


Figure 21 Diagram of the cognitive source model

The cognitive source model proposes that the anomalous beliefs are the cause of similar anomalous experiences rather than the result of them.

Testing of model fit

EQS provided the following satisfactory message "PARAMETER ESTIMATES APPEAR IN ORDER, NO SPECIAL PROBLEMS WERE ENCOUNTERED DURING OPTIMIZATION."

a) residuals

An examination of the residual covariance matrix found that they were generally quite small (average off-diagonal absolute standardised residuals = 0.0640) and asymmetrically-distributed. There were six residuals with an absolute magnitude greater than 0.1, one of which, for the covariance between belief measures, was 0.456. The presence of these relatively large residuals suggests that the model fit could still be improved.

b) model chi-square

The model chi-square value (see Table 38) indicated that there was a significant difference between the data and the proposed model, which means that the model does not fit the data. The Satorra-Bentler Scaled chi-square value is also significant and does not support the proposed model. The indices of fit also confirm that the proposed model does not provide a sufficiently good fit to the data, as these indices are all less than 0.9.

Table 38 Measures of fit for the cognitive source model

Measures of fit	Value	df	p
Independence model chi-square value	431.812	28	$p < .001$
Model chi-square value	93.923	12	$p < .001$
Satorra-Bentler Scaled chi-square value	96.4398	12	$p < .00001$
χ^2 difference test	337.889	16	$p < .001$
χ^2 difference test (Scaled)	335.3722	16	$p < .001$
Bentler-Bonett Normed Fit Index (NFI)	0.782		
Bentler-Bonett Non-normed Fit Index (NNFI)	0.527		
Comparative Fit Index (CFI)	0.797		

Post-hoc analyses

i) Lagrange multiplier test

The Lagrange multiplier test suggested adding a path between non-UFO and UFO-related anomalous beliefs (multivariate χ^2 (1, N=213) = 44.083, $p < .001$).

After the addition of this path (plus allowance of covariation between the error variances for the anomalous experience measures) the Lagrange multiplier test suggested that the addition of a path from the childhood fantasy proneness measure to the non-UFO-related beliefs measure (multivariate χ^2 (1, N=213) = 5.459, $p = .019$) would also improve the fit. Although the probability associated with this addition was slightly above the conservative $p< .01$ criterion that was used for accepting additions to the experiential source model this path was still added because it was of theoretical interest in that a similar path is proposed in Irwin's (1992, 1993a) model of the antecedents of paranormal belief.

ii) Wald test

The Wald test suggested the removal of the paths between the childhood dream experiences and UFO-related anomalous experiences measures (multivariate χ^2 (1, N=213) = 0.218, p = 0.640), the childhood sleep disorders symptoms and UFO-related anomalous experiences measures (multivariate χ^2 (2, N=213) = 0.981, p = 0.612), the childhood fantasy proneness and UFO-related anomalous experiences measures (multivariate χ^2 (3, N=213) = 3.715, p = 0.294), and between the childhood fantasy proneness and non-UFO-related anomalous experiences measures (multivariate χ^2 (4, N=213) = 5.486, p = 0.241).

iii) Results of suggested modifications

Table 39 shows that the addition of a path from the non-UFO-related to the UFO-related anomalous beliefs measure resulted in a model that did fit the data. This is shown by the nonsignificant model χ^2 and Satorra-Bentler Scaled χ^2 values which mean that there is no significant difference between the data and this revised model. The fit indices for this modified model are also greater than 0.9, which also supports the fit of this model. The fit of the model was also improved slightly by the addition of a path between childhood fantasy proneness and the non-UFO-related anomalous beliefs measure.

Deletion of the paths suggested by the Wald test did not improve the fit to a great extent (in fact, it worsened slightly according to the fit indices and the χ^2) and so these paths remained in the final solution.

Table 39 Measures of fit for the cognitive source model with and without suggested modifications

Post hoc modification	Model χ^2	Satorra-Bentler Scaled χ^2	Bentler-Bonett NFI	Bentler-Bonett NNFI	CFI
Model prior to Lagrange and Wald suggested modifications	93.323 df = 12 $p < .001$	96.440 df = 12 $p < .00001$	0.782	0.527	0.797
Addition Non-UFO-related to UFO-related anomalous beliefs and E5-E6 covariance	11.384 df = 10 $p = 0.328$	11.627 df = 10 $p = 0.311$	0.974	0.990	0.997
Addition Childhood fantasy proneness to non-UFO-related anomalous beliefs and E7-E8 covariaance	4.687 df = 8 $p = 0.790$	5.0161 df = 8 $p = 0.756$	0.989	1.029	1.000
Deletion Childhood dream experience to UFO-related anomalous experiences	4.938 df = 9 $p = 0.840$	5.1476 df = 9 $p = 0.821$	0.989	1.031	1.000
Deletion Childhood sleep disorders to UFO-related anomalous experiences	5.870 df = 10 $p = 0.826$	6.0536 df = 10 $p = 0.811$	0.986	1.029	1.000
Deletion Childhood fantasy proneness to UFO-related anomalous experiences	8.903 df = 11 $p = 0.631$	9.1195 df = 11 $p = 0.611$	0.979	1.013	1.00
Deletion Childhood fantasy proneness to non-UFO-related anomalous experiences	EQS had problems converging on a solution with this path deleted and had to place constraints on some of the parameters in order to do so. EQS warned that this solution should not be trusted.				

Figure 22 Diagram of the results of the SEM for the final version of the cognitive source model

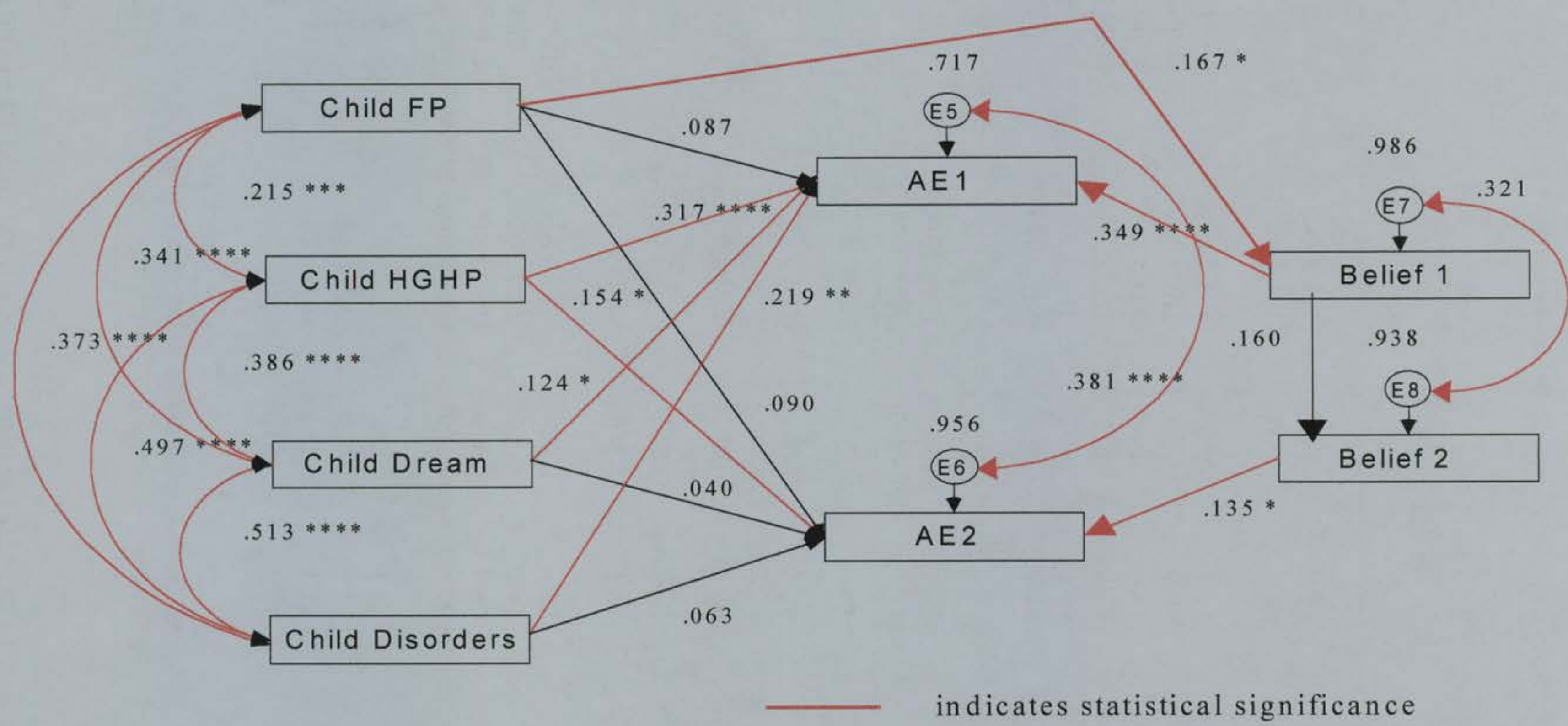


Table 40 Values of path coefficients for the final cognitive source model

Path	Unstandardised path coefficient (standardised)	Robust standard error	Robust z score	*p* value
Child FP-AE1	.020 (.087)	.012	1.64	.0505
Child HG/HP-AE1	.182 (.317)	.041	4.43	< .00002
Child dream-AE1	.074 (.124)	.035	2.12	.0170
Child disorders-AE1	.154 (.219)	.045	3.45	.00028
Child FP-AE2	.008 (.090)	.007	1.20	.1151
Child HG/HP-AE2	.035 (.154)	.019	1.90	.0287
Child dream-AE2	.009 (.040)	.020	0.47	.3192
Child disorders-AE2	.018 (.063)	.023	0.76	.2236
Belief1-AE1	.552 (.349)	.071	7.75	< .00002
Belief2-AE2	.061 (.135)	.030	2.06	.0197
Child FP-Belief1	.024 (.167)	.010	2.50	.0124 (two-tailed)
Belief1-Belief2	.224 (.160)	.590	0.38	.704 (two-tailed)

Path	Covariance (correlation)	Robust standard error	Robust z score	*p* value
Child FP-HG/HP	.521 (.215)	.168	3.10	.00097
Child FP-dream	.795 (.341)	.160	4.96	< .00002
Child FP-disorders	.735 (.373)	.127	5.78	< .00002
Child HG/HP-dream	.364 (.386)	.067	5.41	< .00002
Child HG/HP-disorders	.396 (.497)	.061	6.46	< .00002
Child dream-disorders	.394 (.513)	.060	6.57	< .00002
E5-E6	.034 (.381)	.007	4.85	< .00002
E7-E8	.053 (.321)	.073	0.73	.2327

Associations

Figure 22 shows that, as predicted, there were significant positive correlations among the childhood fantasy proneness, hypnagogic/hypnopompic, dream and sleep disorder symptoms variables. The magnitude of these correlations was identical to those in the experiential and cognitive source models. There were also positive correlations between the residual errors for the anomalous experience (.381) and anomalous belief measures (.321); these suggest that there are other variables, not included in the model, that might influence both of these variables.

Direct relationships

As predicted, childhood hypnagogic/hypnopompic experiences, dream experiences and sleep disorder symptoms were significant positive predictors of the incidence of non-UFO-related anomalous experiences. The path coefficient between childhood fantasy proneness and non-UFO-related anomalous experiences was in the predicted direction and was approaching significance ($p = 0.0505$). As the level or incidence of these childhood variables increases, the overall incidence of non-UFO-related anomalous experiences also increases. Again, only the childhood HG/HP experience measure was a significant direct predictor (0.154) of the incidence of UFO-related anomalous experiences. As with the experiential source model, the magnitude of the path coefficients was quite small (0.087-0.317) and the childhood HG/HP experience measure was the best of the predictors. Unlike the experiential source model, the path between childhood dream experiences and non-UFO-related anomalous experiences (0.124) was statistically significant.

It is estimated that the childhood predictors and the respective anomalous beliefs measure accounted for approximately 49% of the variance in the non-UFO-related anomalous experiences measure but only about 9% of the variance in the UFO-related anomalous experiences measure.

As predicted, the levels of non-UFO-related and UFO-related anomalous beliefs were significant positive predictors of their respective experiences. As the level of non-UFO-related anomalous beliefs increases, the overall incidence of such experiences also increases; a similar relationship held for the UFO-related anomalous beliefs and experiences. However, although non-UFO-related beliefs were quite a good predictor (0.349) of associated experiences, the same was not true for UFO-related beliefs and experiences (0.135).

Post hoc modifications to the original model revealed that the level of childhood fantasy proneness was a small (.167) but significant direct positive predictor (two-tailed) of the level of adult belief in non-UFO-related anomalous phenomena. The level of belief in non-UFO-related phenomena was also a small (.160) but nonsignificant positive predictor of the level of belief in UFO-related anomalous phenomena. Irwin's (1992, 1993a) model contains a similar direct path between fantasy proneness and paranormal beliefs.

It is estimated that the predictors accounted for only 3% of the variance in the level of adult belief in non-UFO-related phenomena but 12% of the variance in the level of UFO-related beliefs.

Indirect relationships

The modified model also suggests that childhood fantasy proneness might also have an indirect effect on the incidence of non-UFO-related anomalous experiences via its effect on belief in non-UFO-related phenomena.

Test of the reciprocal causation model

Model specification

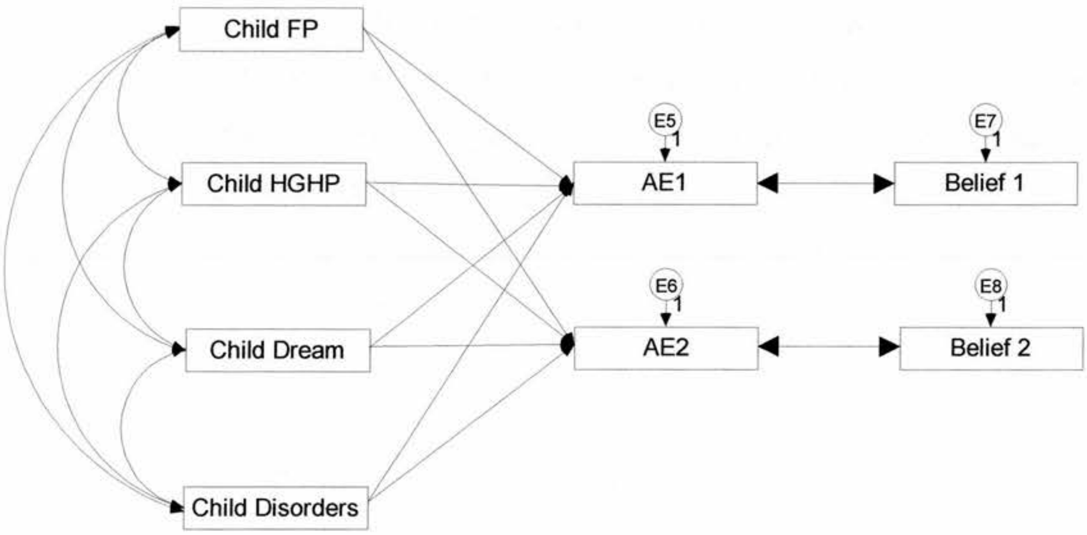


Figure 23 Diagram of the reciprocal causation model

The reciprocal model proposes that the anomalous experiences cause anomalous beliefs and vice versa.

Testing of model fit

EQS reported difficulties in estimating and converging upon a solution for the proposed model. In order to reach a solution it had to set the variance of the UFO-related anomalous experience measure to zero and it warned that the error variance was linearly dependent on other variables. This is clearly indicative of a potentially unstable and, to some extent, a forced solution. The EQS software also warned that these test results may not be appropriate.

a) residuals

An examination of the residual covariance matrix found that the residuals were generally quite small (average off-diagonal absolute standardised residuals = 0.0801) and asymmetrically-distributed, although nine of the standardised residuals were greater than 0.1. The residual matrix left when comparing the model and the data covariance matrices showed that the residual for the covariance between the anomalous experiences measures and the residual for the covariance between the anomalous beliefs measures were both greater than 0.45 which suggest that the model was not explaining these relationships. There was a similar situation with the initial test of the experiential source model. If the variables themselves are related, and only a small proportion of the variance in each of these variables is accounted for by the independent variables, then it is possible that the error terms (which reflect the amount of unexplained variance) may also be related. Thus, the model was respecified and covariances between the error variances for the anomalous experiences and anomalous beliefs measures, respectively, were allowed.

b) model chi-square

Table 41 Measures of fit for the reciprocal causation source model

Measures of fit	Value	df	*p*
Independence model χ^2	431.812	28	$p < .001$
Model χ^2	104.739	10	$p < .001$
Satorra-Bentler Scaled χ^2	95.172	10	$p < .00001$
χ^2 difference test	327.073	18	$p < .001$
χ^2 difference test (Scaled)	336.640	18	$p < .001$
Bentler-Bonett Normed Fit Index (NFI)	0.757		
Bentler-Bonett Non-normed Fit Index (NNFI)	0.343		
Comparative Fit Index (CFI)	0.765		

The chi-square difference tests (see Table 41) indicated that the hypothesised model provided a significant improvement in fit compared to the independence model. However, the model chi-square value showed that there was a significant difference between the data and the proposed model. The Satorra-Bentler Scaled chi-square value was also significant and did not support the proposed model. Indices of fit also suggested that the proposed model did not provide a sufficiently good fit to the data as these were well below 0.9.

Respecification of the reciprocal causation model

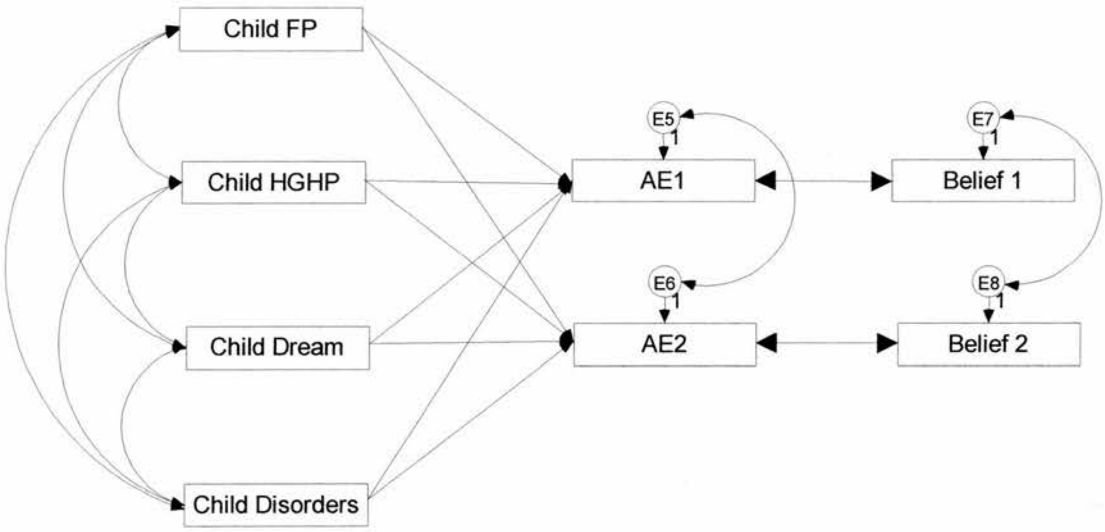


Figure 24 Diagram of the revised reciprocal causation model

a) residuals

An examination of the residual covariance matrix for this revised reciprocal causation model found that the residuals were very small (average off-diagonal absolute standardised residuals = 0.0090) which is a sign of a good model fit. Only one residual had an absolute magnitude greater than 0.1 (for covariance between childhood fantasy proneness and non-UFO beliefs).

b) model chi-square

Chi-square difference tests (see Table 42) indicated that the hypothesised model provided a significant improvement in fit compared to the independence model. The model chi-square value indicated that there was no significant difference between the data and the proposed model, which is therefore supportive of the model. The Satorra-Bentler Scaled chi-square value is also non-significant and supportive of the proposed model. The indices of fit were all greater than 0.9 which also confirms that the revised reciprocal causation model provides a good fit to the data.

Table 42 Measures of fit for the revised reciprocal causation model

Measures of fit	Value	df	*p*
Independence model chi-square value	431.812	28	$p < .001$
Model chi-square value	7.548	8	$p = 0.4788$
Satorra-Bentler Scaled chi-square value	7.626	8	$p = 0.4708$
χ^2 difference test	414.141	20	$p < .001$
χ^2 difference test (Scaled)	413.615	20	$p < .001$
Bentler-Bonett Normed Fit Index (NFI)	0.983		
Bentler-Bonett Non-normed Fit Index (NNFI)	1.004		
Comparative Fit Index (CFI)	1.000		

Post-hoc analyses

i) Lagrange multiplier test

The Lagrange multiplier test also suggested adding a number of other paths (including direct paths between childhood fantasy proneness and the anomalous beliefs measures) but none of these were estimated to make a significant improvement to the model fit. For this reason, there was no point in testing a modified version of the reciprocal causation model with additional direct links between fantasy proneness and anomalous beliefs, as proposed by Irwin (1992, 1993a).

ii) Wald test

The Wald test suggested the removal of four paths: one between UFO-related beliefs and UFO-related anomalous experiences (multivariate χ^2 (1, N=213) = 0.154, p = 0.695); one between childhood dream experiences and UFO-related anomalous experiences (multivariate χ^2 (2, N=213) = 0.312, p = 0.856); one between childhood sleep disorder symptoms and UFO-related anomalous experiences (multivariate χ^2 (3, N=213) = 0.983, p = 0.805); and one between UFO-related anomalous experiences and UFO-related anomalous beliefs (multivariate χ^2 (4, N=213) = 4.122, p = 0.390).

Table 43 Measures of fit for the revised reciprocal causation model with and without suggested modifications

Post hoc modification	Model χ^2	Satorra-Bentler Scaled χ^2	Bentler-Bonett NFI	Bentler-Bonett NNFI	CFI
Model prior to Lagrange and Wald suggested modifications	7.548 df = 8 p = 0.4788	7.626 df = 8 p = 0.4708	0.983	1.004	1.000
Deletion UFO-related anomalous beliefs to UFO-related experiences	7.719 df = 9 p = 0.5629	7.762 df = 9 p = 0.5583	0.982	1.010	1.000
Deletion Childhood dream variable and UFO-related anomalous experiences	7.905 df = 10 p = 0.6381	7.823 df = 10 p = 0.6461	0.982	1.015	1.000
Deletion Childhood sleep disorders symptoms and UFO-related anomalous experiences	8.716 df = 11 p = 0.6481	8.641 df = 11 p = 0.6583	0.980	1.014	1.000
Deletion UFO-related anomalous experiences and UFO-related beliefs	7.755 df = 6 p = 0.2566	7.939 df = 6 p = 0.2426	0.980	0.983	0.995

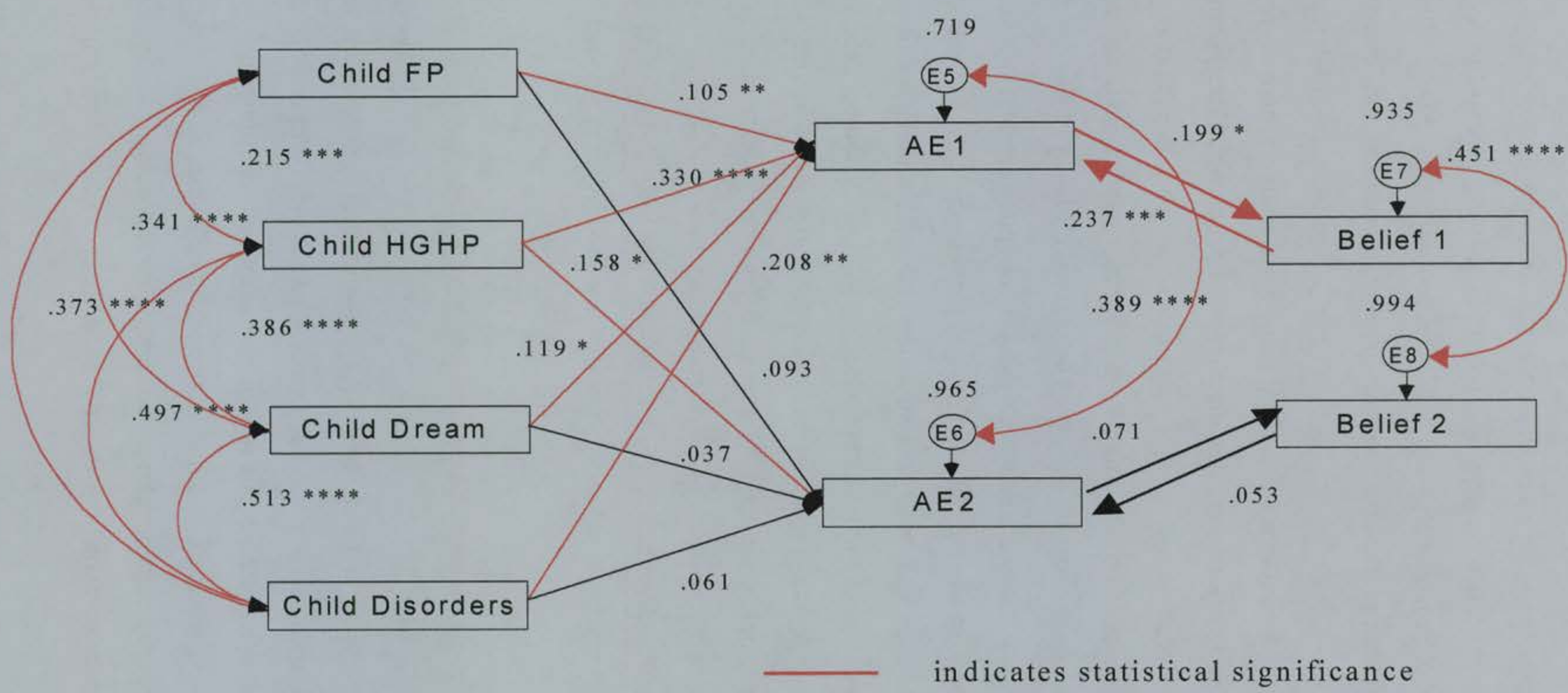
iii) Results of suggested modifications

Table 43 shows that the deletion of the paths suggested by the Wald test did not improve the fit to a great extent. In order to minimise capitalisation of idiosyncrasies in the sample and modifying the model to fit the data, the suggested deletions were not incorporated in the final solution.

Table 44 Values of path coefficients for the final reciprocal causation model

Path	Unstandardised path coefficient (standardised)	Robust standard error	Robust z score	p value
Child FP-AE1	.025 (.105)	.012	1.97	.0244
Child HG/HP-AE1	.191 (.330)	.041	4.62	< .000027
Child dream-AE1	.072 (.119)	.036	1.99	.0233
Child disorders-AE1	.148 (.208)	.046	3.19	.00071
Child FP-AE2	.009 (.093)	.007	1.26	.1038
Child HG/HP-AE2	.036 (.158)	.019	1.92	.0274
Child dream-AE2	.009 (.037)	.020	0.43	.3336
Child disorders-AE2	.017 (.061)	.023	0.75	.2266
AE1-Belief1	.124 (.199)	.061	2.02	.0217
Belief1-AE1	.380 (.237)	.122	3.11	.00094
AE2-Belief2	.158 (.071)	.301	0.53	.2981
Belief2-AE2	.024 (.053)	.061	0.39	.3483
Path	**Covariance (correlation)**	**Robust standard error**	**Robust z score**	**p value**
Child FP-HG/HP	.521 (.215)	.168	3.10	.00097
Child FP-dream	.795 (.341)	.160	4.96	< .00002
Child FP-disorders	.735 (.373)	.127	5.78	< .00002
Child HG/HP-dream	.364 (.386)	.067	5.41	< .00002
Child HG/HP-disorders	.396 (.497)	.061	6.46	< .00002
Child dream-disorders	.394 (.513)	.060	6.57	< .00002
E5-E6	.035 (.389)	.007	4.94	< .00002
E7-E8	.075 (.451)	.011	6.54	< .00002

Figure 25 Diagram of the results of the SEM for the final version of the reciprocal causation model



Associations

Figure 25 shows that, as predicted, there were significant positive correlations among the childhood fantasy proneness, hypnagogic/hypnopompic, dream and sleep disorder symptoms variables. There were also significant positive correlations between the residual errors for the anomalous experiences (0.389) and anomalous beliefs (0.451) measures which suggest that there are additional variables, not specified in the model, that can account for variability in both non-UFO-related and UFO-related experiences and beliefs, respectively.

Direct relationships

As predicted, childhood fantasy proneness, hypnagogic/hypnopompic experiences, dream experiences and sleep disorder symptoms were all significant positive predictors (range .105-.330) of the incidence of non-UFO-related anomalous experiences. The standardised path coefficients for the childhood predictors also indicated that the childhood HG/HP experience measure is the best of these at predicting the overall incidence of non-UFO-related anomalous experiences. Only the childhood hypnagogic/hypnopompic experience measure was a significant but small (.158) direct predictor of the incidence of UFO-related anomalous experiences.

It is estimated that the childhood predictors plus the respective anomalous beliefs measure accounted for approximately 48% of the variance in the incidence of non-UFO-related anomalous experiences but only about 7% of the variance in the incidence of UFO-related anomalous experiences. This is only approximate as it does not take the correlations between the residual errors into account. Clearly, this reciprocal causation model is quite poor when it comes to accounting for variability in UFO-related anomalous experiences.

As predicted, the incidence of non-UFO-related anomalous experiences was a significant positive predictor (0.199) of the level of non-UFO-related beliefs and vice versa (0.237). As the overall incidence of non-UFO-related anomalous experiences increases, the belief in such phenomena also increases and vice versa. However, contrary to expectations, the reciprocal paths between UFO-related anomalous experiences and beliefs were small and nonsignificant but in the predicted direction.

It is estimated that the anomalous experience measures accounted for only 13% of the variance in the level of adult belief in non-UFO-related phenomena and only 1% of the variance in the level of UFO-related beliefs, respectively. Again these are only rough estimates as they do not take into account the correlations between the residual variances. Again, this model is much better at explaining variance relating to non-UFO-related rather than UFO-related phenomena measures and is better at explaining variance in non-UFO-related anomalous experiences rather than beliefs.

There is some evidence to support the revised reciprocal causation model but it seems to only apply to non-UFO-related phenomena. However, this may be because of the low levels of UFO-related experience and beliefs and the low variability of these measures within the sample; this would make it difficult for any true relationships to show up. There is support for the reciprocal causation hypothesis that suggests that reports of anomalous experiences might cause anomalous beliefs and that anomalous beliefs might also cause reports of anomalous experiences, which supports Irwin's (1992, 1993a) model.

Indirect relationships

As predicted, the childhood fantasy proneness, hypnagogic/hypnopompic experience, dream experiences and sleep disorder symptoms variables were also indirect predictors of non-UFO-related anomalous beliefs via their association with the incidence of non-UFO-related anomalous experiences. The indirect relationship between childhood fantasy proneness and non-UFO-related anomalous experiences is supportive of Lawrence's (1998; Lawrence et al., 1995). The Lagrange multiplier test did not suggest that the fit of the model could be improved by the addition of direct paths between the childhood fantasy proneness measure and the anomalous beliefs measures; this does not therefore support Irwin's (1992, 1993a) model, which postulates such direct paths.

Because there is always a danger that particular models may only fit one particular sample due to its unique idiosyncrasies, it is important to cross-validate the factor structure and the fit of the model using different data samples (Hoyle & Panter, 1995; MacCallum, 1995; MacCallum & Austin, 2000; Neill et al., 1999). As outlined in Chapter 6, there are also concerns over the equivalence of WWW versus more traditional pencil-and-paper measures. Thus, a traditional pencil-and-paper survey using the same questionnaire was also carried out (see Chapter 10). It was anticipated that SEM analysis of this data would be able to establish whether the models are robust enough to be confirmed and also whether the administration and completion method may have any significant effect on the results. In order to avoid duplication and to facilitate comparisons, the results of the SEM analyses for both surveys will be discussed together in Chapter 11.

Chapter 10

Factor analysis of survey items and test of proposed models using structural equation modelling (SEM) and traditional pencil-and-paper survey data

This chapter will outline the details of the traditional pencil-and-paper survey plus the results of the factor and SEM analyses that were conducted to see whether the results from the WWW sample would be confirmed using a different questionnaire administration and completion method.

Design

This survey used a pencil-and-paper version of the questionnaire. The questionnaire was basically the same as the one used in both of the WWW surveys (see Appendix 1), although the instructions were modified slightly to reflect the changes in administration and method of completion.

Participants

This survey used an opportunity sample. Student participants were recruited via invitations made at the start of a number of undergraduate psychology classes held at University College Northampton (UCN). UCN staff members were recruited via an e-mail message that was sent to all staff. Other participants were recruited via personal invitations from the author to friends and colleagues. In a few cases, a participant recruited further participants from their friends or colleagues.

Three hundred and fifty copies of the questionnaire were distributed, one hundred and fifty-one completed questionnaires were returned. This provided a 43% response rate. Ninety-three participants were undergraduate psychology students, 45 were UCN staff members and 13 were friends/colleagues of the author or of some of the participants. There were 35 male and 114 female (2 unspecified) participants aged

18-64 years (mean = 28.77, S.D.= 10.77). Ninety-six per cent of the participants were British, 1% other European, 1% non-European and 1% were of an unspecified nationality. Forty-four per cent of the participants had practised or were practising some form of mental discipline, exercise or self-improvement program.

Survey questions

The survey questions were the same as those used in the WWW surveys with the exception of the exploding head symptoms item which was changed from 'Have you ever experienced sensations of explosions and/or sensations of flashing lights in the head as **you are falling asleep**?' to 'Have you ever experienced sensations of explosions in the head as **you are falling asleep**?' This change was made to improve the specificity of the question and the resulting answers.

Procedure

Questionnaires were distributed to the undergraduate students at the start of a number of psychology classes and interested participants were asked to place completed questionnaires in a sealed box placed outside the author's office. UCN staff members who accepted the e-mail invitation to participate were sent a copy of the questionnaire via the college internal mail system and they were asked to return the completed questionnaire in the same manner or to place it in the aforementioned box. Other participants were recruited via personal invitations from the author to friends and colleagues. In a few cases, a participant recruited further participants from their own friends or colleagues. In all cases, the participants filled out the questionnaire in their own time.

Principal factor analysis

Principal factor analyses of the childhood fantasy proneness, sleep-related experience, anomalous experiences and anomalous belief items were conducted in order to check whether the factor structure identified with the WWW survey data would be confirmed using the traditional pencil-and-paper survey data. Principal factor analysis of the WWW survey data using orthogonal rotation (see Chapter 8) found significant correlations among the factors and so only the obliquely rotated solutions were interpreted. For this reason, only obliquely rotated solutions were generated and interpreted for the traditional pencil-and-paper survey data.

Obliquely-rotated solutions

Anomalous beliefs

Table 45 shows that all of the belief items loaded positively on factors 1 and 2. All items loaded greater than .3 (the chosen criterion for acceptance) on factor 1; the majority of items loaded greater than .3 on factor 2 with the exception of the belief in life after death, déjà vu, NDE and spiritual/mystical/transcendental experience items. Belief items relating to UFOs loaded highest on factor 2. The results confirm that the belief items could usefully be divided into two separate factors relating to non-UFO-related and UFO-related beliefs, respectively.

Table 45 Structure matrix for anomalous belief items following oblique (oblimin) rotation

Item	Factor 1	Factor 2
DMILS	.811	.413
General ESP	.775	.415
Precognition	.775	.384
Awareness of deceased person	.756	.381
Telepathy	.750	.377
Contact spirits of the dead	.737	.438
Ability to see auras	.704	.411
Psychokinesis	.684	.470
Memories of previous life	.674	.463
Outbreak of inexplicable noises	.667	.354
Out-of-body experience	.661	.315
Near-death experience	.651	.283
Spiritual, mystical, transcendental experience	.603	.195
Heal person via mind	.597	.384
Life after death	.495	.265
Déjà vu	.467	3.16×10^{-2}
Life on other planets	.335	.602
Extra-terrestrial visitation of Earth	.504	.914
Extra-terrestrial communication with Earth	.479	.939
Extra-terrestrials have allowed humans on board	.419	.793

Table 46 Factor correlation matrix for anomalous beliefs factors

	Factor correlation matrix	
Factor	1	2
1	1.000	.463
2	.463	1.000

Table 46 shows that the anomalous belief factors 1 and 2 are significantly correlated with each other to quite a large extent, although the direction of the relationship is opposite to that obtained with the WWW survey data.

Childhood-adulthood anomalous experiences

The structure matrix (see Table 47) shows that the majority of the non-UFO-related childhood-adulthood anomalous experience items loaded greater than the criterion of .3 on factor 1 with the exception of the déjà vu, unexplained bites/scratches/pinches, childhood experience of being healed and childhood communication with the dead items. Three of the eight UFO-related items could not be entered into the factor analysis because there was no variance in the scores on these items. Four of the remaining five UFO-related items loaded higher on factor 2 and three of these items had loadings greater than .3. Although the factor structure is not quite so clear-cut and some of the UFO-related items could not be included in the factor analysis of this traditional pencil-and-paper survey data, the results do confirm that the childhood-adulthood anomalous experience items could still be usefully divided up into two factors: a non-UFO-related anomalous experiences factor and a UFO-related anomalous experiences factor.

Table 47 Structure matrix for anomalous experience items following oblique (oblimin) rotation

Item	Factor	
	1	2
OBE (adult)	.785	.227
Seeing auras (adult)	.777	.336
Autoscopic phenomenon (adult)	.694	-1.74×10^{-2}
Memories of previous life (adult)	.682	.471
OBE (child)	.678	.219
Communication with the dead (adult)	.659	.327
Spiritual, mystical, transcendental (adult)	.658	.227
Near-death experience (adult)	.645	.373
Being healed by others (adult)	.630	.295
Dream ESP (adult)	.621	.548
Apparition/presence (adult)	.605	.529
Seeing with eyes closed (adult)	.591	.351
Healing others (adult)	.581	.513
Psychokinesis (adult)	.577	.443
Waking ESP (adult)	.559	.563
Apparition/presence (child)	.559	.524
Waking ESP (child)	.517	.616
Spiritual, mystical, transcendental (child)	.514	8.85×10^{-2}
Dream ESP (child)	.510	.525
Autoscopic phenomenon (child)	.488	8.49×10^{-2}
Psychokinesis (child)	.482	.379
Seeing auras (child)	.473	.241
Near-death experience (child)	.446	.326
Memories of previous life (child)	.422	.511
Unexplained noises (child)	.386	.545
Healing others (child)	.360	.306
Seeing with eyes closed (child)	.357	.305
Unexplained noises (adult)	.306	.549
Déjà vu (adult)	.272	.418
Being healed by others (child)	.239	.361
Communication with the dead (child)	.239	.223
Déjà vu (child)	.180	.304
Unexplained bites, scratches, pinches (adult)	.172	.651
Unexplained bites, scratches, pinches (child)	.113	.630
Seeing strange lights/objects in sky (child)	.125	.453
Seeing strange lights/objects in sky (adult)	.200	.484
Seen a UFO at close range (child)	6.06×10^{-2}	.279
Seen a UFO at close range (adult)	.173	.512
Contact with UFO occupants (adult)	.381	9.62×10^{-2}

Table 48 Factor correlation matrix for anomalous experience factors

	Factor correlation matrix	
Factor	1	2
1	1.000	.402
2	.402	1.000

Table 48 shows that, as with the WWW survey data, there is a significant positive correlation between factor 1 and factor 2 of the childhood-adulthood anomalous experience items.

Childhood sleep-related experiences

Table 49 shows that, as with the WWW survey data, there is a cluster of items loading higher than the criterion of 0.3 on each of factors 1-3. The results suggest that the childhood sleep-related experience items could still be usefully divided up into the three factors suggested by the analysis of the WWW survey data: a childhood sleep disorders symptoms factor, a childhood dream experiences factor and a childhood HG/HP experiences factor. Although not all of the items loaded greater than .3 on the factors suggested by the previous analysis, the overall picture supports the factor structure obtained with the WWW survey data and so the same items will be included in the scales for the SEM analysis with this traditional pencil-and-paper survey data.

Table 49 Structure matrix for childhood sleep-related experience items following oblique (oblimin) rotation

	Factor		
	1	2	3
Hypnagogic imagery	.398	.217	.506
Hypnopompic imagery	.357	.204	.666
Exploding head symptoms	.197	.208	.264
Pre-dormital sleep paralysis	.352	.222	.410
Post-dormital sleep paralysis	.381	.447	.496
Sleep starts	.468	.243	.326
Dream recall	.315	.228	.279
Dream control 1	.128	.667	.185
Dream control 2	.114	.527	.139
Vivid dreams	.433	.342	.427
Flying dreams	.223	.280	.408
Falling dreams	.343	.313	.405
Prelucid dreams	.207	.621	9.18×10^{-2}
Lucid dreams	.331	.612	.367
False awakenings (Type 1)	.175	.627	8.36×10^{-2}
False awakenings (Type 2)	.216	.590	.314
Sleep terrors	.722	.309	.280
Nightmares	.626	.352	.159
REM sleep behaviour disorder	.564	.107	.359
Sleep choking	.268	.163	.464
Sleepwalking	.578	-1.73×10^{-2}	.212
Sleep talking	.726	.136	.350
Confusional arousals	.438	.214	.368
Rhythmic movement disorder	.159	4.29×10^{-2}	.609
Nocturnal leg cramps	.289	.201	.180
Sleep bruxism	.260	5.71×10^{-2}	.235
Sleep enuresis	.195	.205	-1.33×10^{-3}
Primary snoring	.384	-4.70×10^{-2}	.342
Excessive sleepiness	.107	5.56×10^{-2}	.295
Cataplexy	.289	.140	.307

Table 50 Factor correlation matrix for childhood sleep-related experience factors

	Factor correlation matrix		
Factor	1	2	3
1	1.000	.299	.433
2	.299	1.000	.232
3	.433	.232	1.000

Table 50 shows that the childhood sleep-related factors are all positively correlated with each other. This is slightly different from the WWW survey findings as the results of that factor analysis found that factors 1 and 2 were negatively correlated.

Childhood fantasy proneness

The structure matrix (see Table 51) shows that the factor structure for the childhood fantasy proneness items is not very clear. Unlike the WWW sample, there is no indication that the majority of the items load more highly on one of the two factors extracted. Fewer than half of the items load greater than the 0.3 criterion on the two factors which suggests that this measure may suffer from a lower reliability. Although a clear single factor did not emerge, in the interests of attempting a replication of the SEM results from the WWW survey, the same items as before will constitute the scale that will be used in subsequent analyses.

Table 51 Structure matrix for childhood fantasy proneness items following oblique (oblimin) rotation

Item	Factor 1	Factor 2
Item 1	2.84×10^{-2}	.487
Item 2	4.35×10^{-2}	.225
Item 3	-.212	.440
Item 4	2.62×10^{-2}	.698
Item 5	.262	-.116
Item 6	.107	.531
Item 7	.398	.394
Item 8	.710	.262
Item 9	.106	.391
Item 10	.200	-1.36×10^{-2}
Item 11	8.64×10^{-2}	.367
Item 12	.646	.104
Item 13	.515	9.25×10^{-2}
Item 14	.398	.225
Item 15	.523	3.76×10^{-2}

Table 52 Factor correlation matrix for childhood fantasy proneness factors

	Factor correlation matrix	
Factor	1	2
1	1.000	.107
2	.107	1.000

Reliability of scales

Item-total correlations and alpha coefficients of reliability were calculated for each proposed new scale. Details of the items which made it into the final scales are available at the end of Chapter 8.

Anomalous beliefs scales

The alpha coefficients of reliability for the non-UFO-related and UFO-related beliefs measures (r = .93 and r = .88, respectively) were greater than the desired criterion value and were of a similar magnitude to those obtained in the WWW sample (r = .91 and r = .90, respectively).

Childhood and adulthood anomalous experiences scales

All 17 and 4 items for factors 1 (non-UFO-related) and 2 (UFO-related), respectively, of the childhood anomalous experience scales met the item-total correlation criterion. The alpha coefficient of reliability for factor 1, r = .83, was greater than the desired criterion value; the alpha coefficient for factor 2, r = .15, was way below the desired value and extremely unreliable.

All 17 items for factor 1 of the adulthood anomalous experience scale met the item-total correlation criterion. The alpha coefficient of reliability for factor 1, r = .90 (WWW r = .89), was greater than the desired criterion value; the alpha coefficient for factor 2, r = .18 (WWW r = .60), was slightly below the desired value. The alpha coefficient with the having been on board a UFO (adult) item deleted (item-total correlation .262) was r = .63. This item was kept in the scale in order to maintain similarity with the childhood version and because its exclusion made little difference to the internal reliability of the scale. The unreliability of the UFO-related measures is due to the low variance of some of the items that do not therefore differentiate between participants and there is little scope for relationships with other items or the overall score.

Childhood sleep-related experience scales

The alpha coefficient of reliability for factor 1 (childhood sleep disorders symptoms) was r = .73 (WWW r = .79) which was greater than the desired criterion value. The alpha coefficient of reliability for factor 2 (childhood dream variables) was r = .79 (WWW r = .85) which was greater than the desired criterion value. The alpha coefficient of reliability for factor 3 (childhood HG/HP experiences) was r = .69 (WWW r = .70) which was the desired minimum criterion value. The reliabilities were of a similar magnitude in both samples.

Childhood fantasy proneness scale

The alpha coefficient of reliability for factor 1 was r = .62 (WWW r = .76) which was slightly lower than the desired criterion value.

Tests of models using SEM analysis

a) Inspection of bivariate correlation matrix

Table 53 Sample correlation matrix

	FP	HGHP	DREAM	DISORDER	AE1	AE2	BELIEF1	BELIEF2
FP	----							
HGHP	.337 **	—						
DREAM	.210 **	.452 **	—					
DISORDER	.260 **	.590 **	.369 **	—				
AE1	.294 **	.552 **	.393 **	.428 **	—			
AE2	.140 *	.239**	.234 **	.285 **	.418 **	—		
BELIEF1	.149*	.232 **	.154 *	.109	.477 **	.257 **	—	
BELIEF2	.141*	.163 *	.208 **	.117	.244 **	.212 **	.545 **	—

* p< .05, ** p< .01, two-tailed

Table 53 shows that, as expected, there were significant positive correlations, of a small to medium magnitude, among the childhood fantasy proneness, HG/HP experience, dream experience and sleep disorders measures. As hypothesised, these variables were all significantly positively correlated with the non-UFO-related and UFO-related anomalous experiences measures, although the effect sizes were larger for relationships with the non-UFO-related measure. The anomalous experience measures were also significantly positively correlated with each other and also with the respective measures of non-UFO-related and UFO-related anomalous beliefs. There was also a significant positive correlation between the current level of both non-UFO-related and UFO-related anomalous beliefs. These correlations suggest that it would be worthwhile to conduct a SEM analysis with the data and that none of the correlations are high enough to cause concerns about possibility multicollinearity.

b) Sample size and missing data

Initially, there were 151 cases in the sample but only 139 cases were included in the final SEM analysis. Twelve cases identified by EQS as making some of the largest contributions to multivariate kurtosis, were excluded.

Bentler and Chou (1987) recommend that five participants per variable is sufficient for normal and elliptical distributions, and 10 per variable for other distributions. With 139 participants and eight variables, the ratio is over 17:1.

c) Normality of sampling distributions

Examination of Mardia's normalised estimate of multivariate kurtosis (= 134.39), prior to the removal of the 12 cases, indicated that it was significantly higher than the standardised mean. Therefore, 12 cases, which were making some of the largest contributions to this estimate, were removed. With the exclusion of these cases, Mardia's normalised estimate of multivariate kurtosis was reduced to 1.92, which is no longer indicative of significant multivariate kurtosis.

Attempted confirmation of the models tested using the WWW survey data

Model identification

As before, there are more data points than parameters to be estimated and so the models are overidentified (see Chapter 3, p. 57; Chou & Bentler, 1995; Ullman, 1996, p. 743) for all three models.

Estimation of parameters

The Maximum Likelihood method of estimation was chosen again for analysis of all three models. The univariate and multivariate deviations from normality also meant that it was prudent to obtain Satorra-Bentler Scaled chi-square estimates of model fit along with robust standard errors.

Table 54 Sample covariance matrix

	FP	HGHP	DREAM	DISORDER	AE1	AE2	BELIEF1	BELIEF2
MEAN	2.691	2.246	2.560	2.317	1.425	1.108	1.203	0.953
SD	1.781	0.842	0.817	0.668	0.394	0.174	0.518	0.538
FP	3.172							
HGHP	0.432	0.710						
DREAM	0.279	0.297	0.668					
DISORDER	0.315	0.341	0.218	0.446				
AE1	0.166	0.207	0.106	0.131	0.155			
AE2	0.064	0.039	0.029	0.026	0.031	0.030		
BELIEF1	0.084	0.099	0.051	0.049	0.094	0.025	0.269	
BELIEF2	0.101	0.075	0.081	0.057	0.069	0.031	0.172	0.289

The determinant of the input sample covariance matrix = 0.222×10^{-4}.

Testing of model fit

Test of the experiential source model

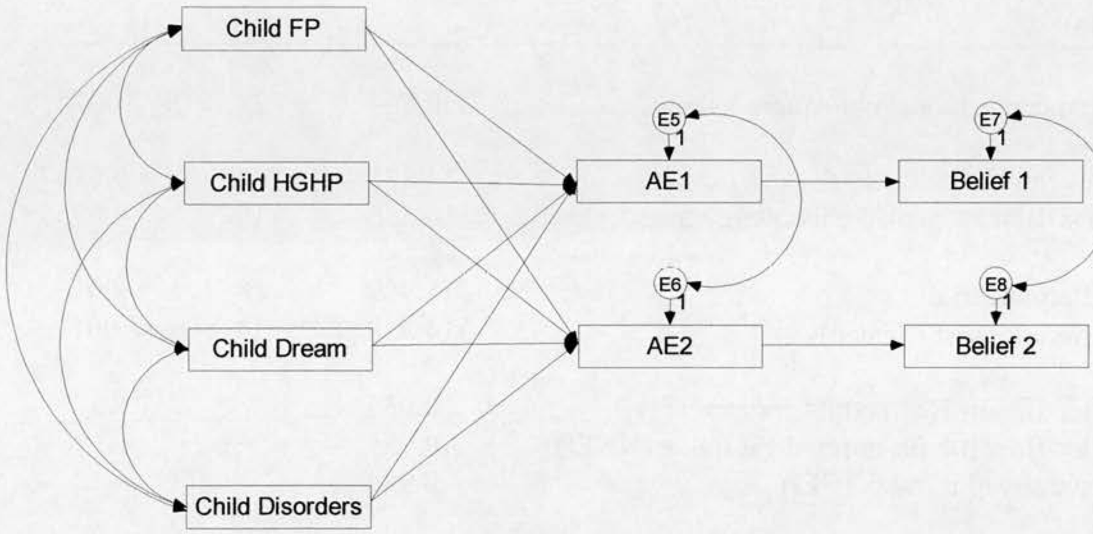


Figure 26 Diagram of the revised experiential source model

a) residuals

An examination of the residual covariance matrix found that the residuals were generally small (average off-diagonal absolute standardised residuals = 0.0382). Six residuals had an absolute magnitude greater than 0.1.

b) model chi-square

The model chi-square value (see Table 55) indicated that there was no significant difference between the data and the proposed model, which is therefore supportive of the model. The Satorra-Bentler Scaled chi-square value is also non-significant and supportive of the proposed model. The indices of fit are all greater than 0.9, which is also indicative of a very good fit between the model and the data. The chi-square values and indices of fit are all very similar to the values obtained from analysis of the

WWW survey data (see Chapter 9), which is indicative of a satisfactory replication as far as these criteria are concerned.

Table 55 Measures of fit for the revised experiential source model

Measures of fit	Value	df	*p*
Independence model chi-square value	330.864	28	$p < .001$
Model chi-square value	14.875	10	$p = 0.1367$
Satorra-Bentler Scaled chi-square value	16.536	10	$p = 0.0853$
χ^2 difference test	315.989	18	$p < .001$
χ^2 difference test (Scaled)	314.328	18	$p < .001$
Bentler-Bonett Normed Fit Index (NFI)	0.955		
Bentler-Bonett Non-normed Fit Index (NNFI)	0.955		
Comparative Fit Index (CFI)	0.984		

Post-hoc analyses

i) Lagrange multiplier test

The Lagrange multiplier test suggested adding a path between the childhood dream experiences and the UFO-related anomalous beliefs measures (multivariate χ^2 (1, N=139) = 4.941, p = .026) but this was not added as the probability of the multivariate increment did not meet the $p < .01$ criterion.

Although it was not suggested by the Lagrange test with this sample, a direct path between the childhood sleep disorder symptoms measure and the non-UFO-related anomalous beliefs measure was suggested and supported by the analysis with the WWW sample. This path was added to this model in order to see whether the model would be confirmed with this traditional pencil-and-paper survey data.

Table 56 Measures of fit for the experiential source model with and without suggested modifications

Post hoc modification	Model χ^2	Satorra-Bentler Scaled χ^2	Bentler-Bonett NFI	Bentler-Bonett NNFI	CFI
Model prior to Lagrange and Wald suggested modifications	14.875 df = 10 $p = 0.1367$	16.536 df = 10 $p = 0.0853$	0.955	0.955	0.984
Addition Childhood sleep disorders to non-UFO-related anomalous beliefs	12.448 df = 9 $p = 0.1892$	13.558 df = 9 $p = 0.1390$	0.962	0.965	0.989
Deletion Childhood dream experience to non-UFO-related anomalous experiences	12.721 df = 10 $p = 0.2397$	13.044 df = 10 $p = 0.2212$	0.962	0.975	0.991
Deletion Childhood sleep disorders to UFO-related anomalous experiences	13.054 df = 11 $p = 0.2898$	13.316 df = 10 $p = 0.2732$	0.961	0.983	0.993
Deletion Childhood fantasy proneness to non-UFO-related anomalous experiences	13.488 df = 12 $p = 0.3346$	13.605 df = 12 $p = 0.3267$	0.959	0.989	0.995
Deletion Childhood dream experience to UFO-related anomalous experiences	14.394 df = 13 $p = 0.3467$	14.401 df = 13 $p = 0.3462$	0.956	0.990	0.995
Deletion Childhood fantasy proneness to UFO-related anomalous experiences	16.801 df = 14 $p = 0.2670$	16.515 df = 14 $p = 0.2830$	0.949	0.982	0.991

ii) Wald test

The Wald test suggested the removal of five paths between the childhood measures and the anomalous experience measures. These suggested deletions included paths between the childhood fantasy proneness and both anomalous experience measures, the childhood dream experience and both anomalous experience measures and between the childhood sleep disorder symptom and non-UFO-related anomalous experiences measure.

iii) Results of suggested modifications

Table 56 shows that, as with the WWW sample, the addition of a direct path between the childhood sleep disorders variable and the current level of non-UFO-related anomalous beliefs provided a better fit to the data. This is indicated by the reduction in the model χ^2 values and the increases in the indices of fit. However, as with the WWW sample, the deletion of the paths suggested by the Wald test did not improve the fit to a great extent and so the suggested deletions were not incorporated into the final solution.

Associations

Figure 27 and Table 57 show that, as predicted and supported by the WWW survey data, there were significant positive correlations among the childhood fantasy proneness, hypnagogic/hypnopompic, dream and sleep disorder symptoms variables with small to medium effect sizes (.215-.513). There were also significant positive correlations between the residual errors for the anomalous experience (.391) and anomalous belief measures (.431); these suggest that there are other variables, not included in the model, that might influence both of these variables. Thus, these aspects of the revised experiential source model were satisfactorily replicated with this traditional pencil-and-paper survey data.

Direct relationships

Figure 27 and Table 57 also show that, as predicted and supported by the WWW survey data, childhood hypnagogic/hypnopompic experiences and sleep disorder symptoms were significant direct predictors of the incidence of non-UFO-related anomalous experiences with standardised path coefficients of 0.490 and 0.176, respectively. The path between childhood fantasy proneness and non-UFO-related

Table 57 Values of path coefficients for the final experiential source model

Path	Unstandardised path coefficient (standardised)	Robust standard error	Robust z score	p value[1]
Child FP-AE1	.009 (.041)	.016	0.57	0.2843
Child HG/HP-AE1	.229 (.490)	.040	5.75	$p < 0.00002$
Child dream-AE1	.019 (.038)	.043	0.43	0.3372
Child disorders-AE1	.104 (.176)	.051	2.05	0.0202
Child FP-AE2	.013 (.132)	.009	1.43	0.0764
Child HG/HP-AE2	.032 (.155)	.025	1.29	0.0985
Child dream-AE2	.019 (.089)	.020	0.95	0.1711
Child disorders-AE2	.015 (.056)	.028	0.53	0.2981
AE1-Belief1	.539 (.426)	.084	6.45	$p < 0.00002$
Child disorders-Belief1	-.088 (-.118)	.047	-1.87	0.0307
AE2-Belief2	.798 (.262)	.174	4.58	$p < 0.00002$

Path	Covariance (correlation)	Robust standard error	Robust z score	p value
Child FP-HG/HP	.432 (.288)	.175	2.47	0.0068
Child FP-dream	.279 (.192)	.118	2.36	0.0091
Child FP-disorders	.315 (.265)	.123	2.55	0.0054
Child HG/HP-dream	.297 (.432)	.062	4.77	$p < 0.00002$
Child HG/HP-disorders	.341 (.605)	.067	5.12	$p < 0.00002$
Child dream-disorders	.218 (.399)	.054	4.03	0.00003
E5-E6	.018 (.366)	.006	3.00	0.0013
E7-E8	.131 (.557)	.021	6.21	$p < 0.00002$

[1] p values associated with z scores are taken from Table A14:1 in Clark-Carter (1997, p. 566).

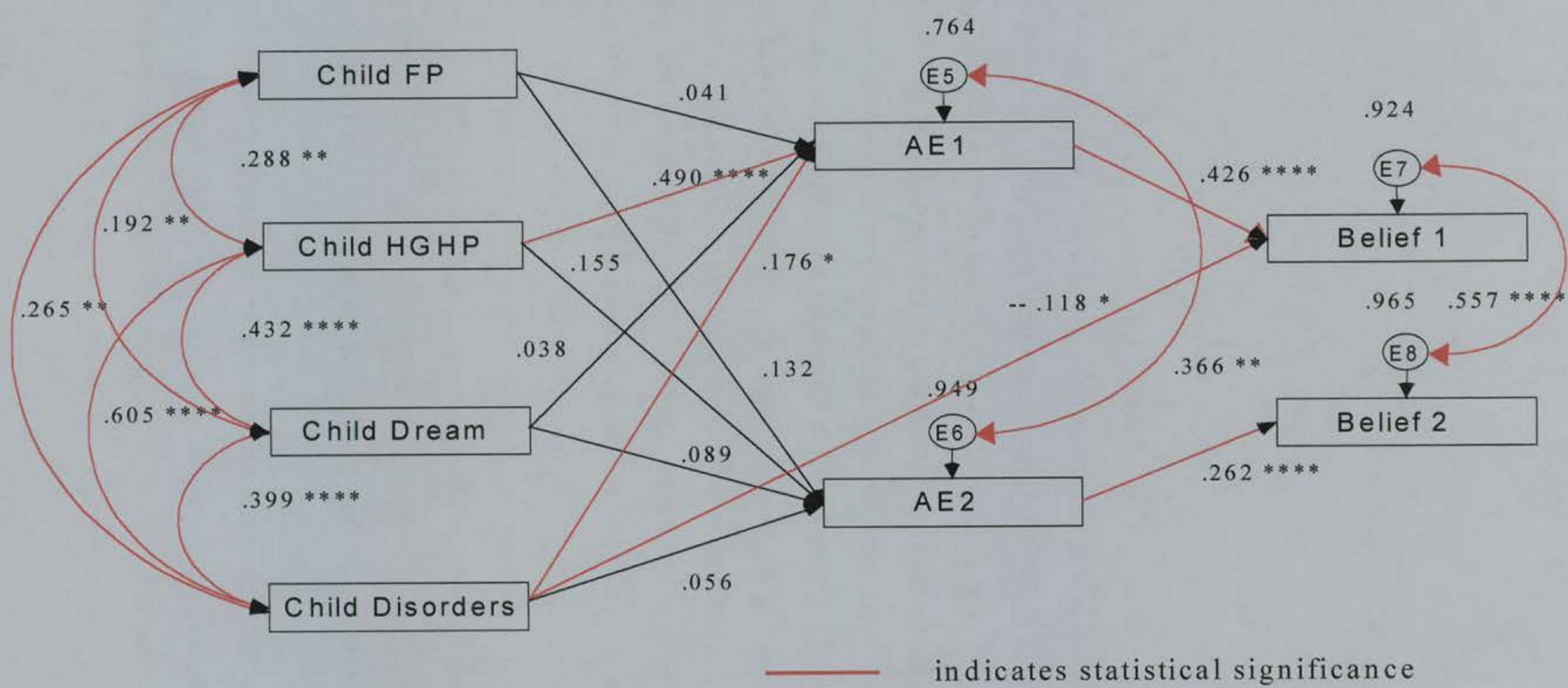
anomalous experiences was positive (0.041) but very small and statistically nonsignificant which was contrary to expectation. As with the WWW survey data, the childhood HG/HP experiences measure was the most important predictor of non-UFO-related anomalous experiences although the magnitude of the path coefficient (0.490) was much larger than that for the WWW survey data (0.364). The childhood dream experiences measure did predict the incidence of non-UFO-related anomalous experiences in the hypothesised direction but to a very small and nonsignificant extent. There were no statistically significant predictors of the incidence of UFO-related anomalous experiences. Unlike the WWW survey data, the childhood HG/HP experiences measure was not a statistically significant predictor of the UFO-related anomalous experiences measure, although this path was approaching significance (p = 0.0985).

It is estimated that the childhood predictors accounted for approximately 42% of the variance in the non-UFO-related anomalous experiences measure, which is slightly greater than the proportion for the WWW survey data (38%); these predictors also accounted for a similar (albeit slightly greater) proportion (10%) of the variance in the UFO-related anomalous experiences measure. These results suggest that the proportions of variance in the anomalous experiences measures that can be explained by this model have been satisfactorily replicated.

As predicted, the non-UFO-related and UFO-related anomalous experiences measures were significant positive predictors of their respective beliefs. As with the WWW survey data, the magnitude of the path coefficient between the non-UFO-related anomalous experiences and beliefs measures (0.426) was much larger than that between the UFO-related measures (0.262). As predicted and as supported by the WWW survey data, these findings provide support for the experiential source basis for anomalous beliefs, particularly where non-UFO-related phenomena are concerned.

Analysis of this sample also confirmed that the incidence of childhood sleep disorders symptoms was a significant negative predictor of the level of belief in non-UFO-related anomalous phenomena, albeit with only a small effect size (-0.118). It is estimated that, as with the WWW survey data, the predictors accounted for a similar proportion (15% vs. 18%) of the variance in the level of adult belief in non-UFO-related phenomena and a similar, but a slightly larger, proportion (7% vs. 2%) of the variance in the level of UFO-related beliefs. Again these results suggest that the proportions of variance in the anomalous beliefs measures that can be explained by this model have been satisfactorily replicated.

Figure 27 Diagram of the results of the SEM for the final version of the experiential source model



Indirect relationships

As predicted and supported by the WWW survey data, the childhood hypnagogic/hypnopompic experience and sleep disorders symptoms measures were also indirect predictors of non-UFO-related anomalous beliefs via their association with the incidence of non-UFO-related anomalous experiences.

Comparison of experiential model fit for the WWW and traditional pencil-and-paper survey samples

In summary, the final solution of the model containing the correlated error variances and the addition of a direct path between the childhood sleep disorders symptoms and non-UFO-related anomalous beliefs measures provided a good and similar level of fit in both the WWW and traditional pencil-and-paper samples. In addition, the model accounted for similar proportions of variance in the anomalous experiences and beliefs measures in both cases. The main difference in the solutions for the two samples is that in the traditional pencil-and-paper sample the paths between the childhood fantasy proneness and non-UFO-related anomalous experiences measures and between the childhood HG/HP and UFO-related anomalous experiences measures were statistically nonsignificant, although the magnitude of the latter path was approaching significance. Thus, the solution obtained from analysis of the WWW survey data seems fairly robust and a number of parameters have been successfully replicated in the traditional pencil-and-paper survey.

Test of the cognitive source model

Model specification

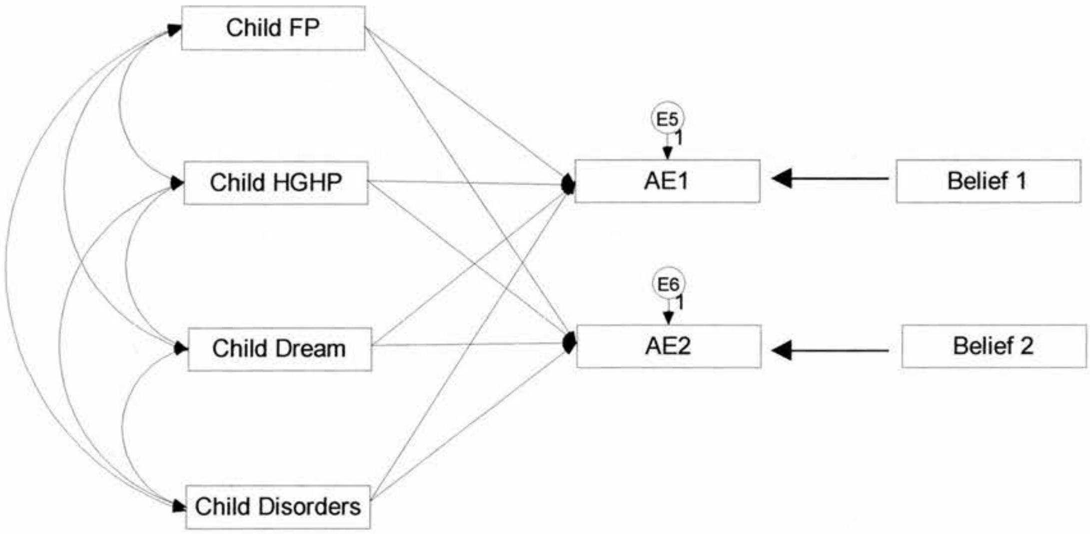


Figure 28 Diagram of the cognitive source model

Testing of model fit

a) residuals

An examination of the residual covariance matrix found that they were generally quite large (average off-diagonal absolute standardised residuals = 0.1175). There were 12 residuals with an absolute magnitude greater than 0.1, one of which, for the covariance between belief measures, was 0.616. The presence of these relatively large residuals suggests that the model, as it is, does not provide a very good fit to the data.

b) model chi-square

As with the WWW survey data, the model chi-square value (see Table 58) indicated that there was a significant difference between the data and the proposed model, which means that, as implied by the large residuals, the model does not fit the data.

The Satorra-Bentler Scaled chi-square value is also significant and does not support the proposed model. The indices of fit also confirm that the proposed model does not provide a sufficiently good fit to the data, as these indices are all less than 0.9. The fit indices for this sample are also slightly lower than for the WWW sample.

Table 58 Measures of fit for the cognitive source model

Measures of fit	Value	df	p
Independence model chi-square value	330.864	28	$p < .001$
Model chi-square value	92.016	12	$p < .001$
Satorra-Bentler Scaled chi-square value	87.965	12	$p < .00001$
χ^2 difference test	238.848	16	$p < .001$
χ^2 difference test (Scaled)	242.899	16	$p < .001$
Bentler-Bonett Normed Fit Index (NFI)	0.722		
Bentler-Bonett Non-normed Fit Index (NNFI)	0.384		
Comparative Fit Index (CFI)	0.736		

Post-hoc analyses

i) Lagrange multiplier test

As with the WWW survey data, the Lagrange multiplier test suggested adding a path between non-UFO and UFO-related anomalous beliefs (multivariate χ^2 (1, N=139) = 52.281, $p < .001$). Additional paths, including allowance of covariation between the error variances for the anomalous experience measures and a direct path from the childhood fantasy proneness to the non-UFO-related anomalous beliefs measure, were also included in line with similar modifications that were made during analysis of the WWW survey data.

ii) Wald test

The Wald test suggested the removal of the paths between the childhood dream experiences and non-UFO-related anomalous experiences measures (multivariate χ^2 (1, N=139) = 0.138, p = 0.710), the childhood sleep disorders symptoms and UFO-related anomalous experiences measures (multivariate χ^2 (2, N=139) = 0.350, p = 0.839), the childhood fantasy proneness and non-UFO-related anomalous experiences measures (multivariate χ^2 (3, N=139) = 0.558, p = 0.906), the childhood dream experiences and UFO-related anomalous experiences measures (multivariate χ^2 (4, N=139) = 0.710, p = 0.950), and between the childhood fantasy proneness and UFO-related anomalous experiences measures (multivariate χ^2 (5, N=139) = 2.572, p = 0.766).

iii) Results of suggested modifications

Table 59 shows that, as with the WWW survey data, the addition of a path from the non-UFO-related to the UFO-related anomalous beliefs measure resulted in a model that did fit the data well. The fit of the model was also improved slightly by the addition of a path between childhood fantasy proneness and the non-UFO-related anomalous beliefs measure. Table 59 also shows that versions of the model with the suggested paths deleted did not lead to any clear improvements to the model fit and thus, as with the WWW survey analysis, no paths were deleted in the final model solution. One should also note that the final solution for the revised model did not provide as good a fit to this data as it did to the WWW survey data. This is indicated by the lower indices of fit and the higher model chi-square values for this sample.

Table 59 Measures of fit for the cognitive source model with and without suggested modifications

Post hoc modification	Model χ^2	Satorra-Bentler Scaled χ^2	Bentler-Bonett NFI	Bentler-Bonett NNFI	CFI
Model prior to Lagrange and Wald suggested modifications	92.016 df = 12 $p < .001$	87.965 df = 12 $p < .00001$	0.722	0.384	0.736
Addition Non-UFO-related to UFO-related anomalous beliefs and E5-E6 covariance	13.091 df= 10 $p = 0.2186$	14.578 df= 10 $p = 0.1482$	0.960	0.971	0.990
Addition Childhood fantasy proneness to non-UFO-related anomalous beliefs and E7-E8	11.386 df= 8 $p = 0.1808$	12.770 df= 8 $p = 0.1200$	0.966	0.961	0.989
Deletion Childhood dream experience to non-UFO-related anomalous experiences	11.591 df= 9 $p = 0.2373$	12.121 df= 9 $p = 0.2066$	0.965	0.973	0.991
Deletion Childhood sleep disorders to UFO-related anomalous experiences	11.795 df= 10 $p = 0.2990$	12.225 df= 10 $p = 0.2703$	0.964	0.983	0.994
Deletion Childhood dream experience to UFO-related anomalous experiences	12.079 df= 11 $p = 0.3577$	12.414 df= 11 $p = 0.3333$	0.963	0.991	0.996
Deletion Childhood fantasy proneness to non-UFO-related anomalous experiences	12.413 df= 12 $p = 0.4131$	12.728 df= 12 $p = 0.3891$	0.962	0.997	0.999

Figure 29 Diagram of the results of the SEM for the final version of the cognitive source model

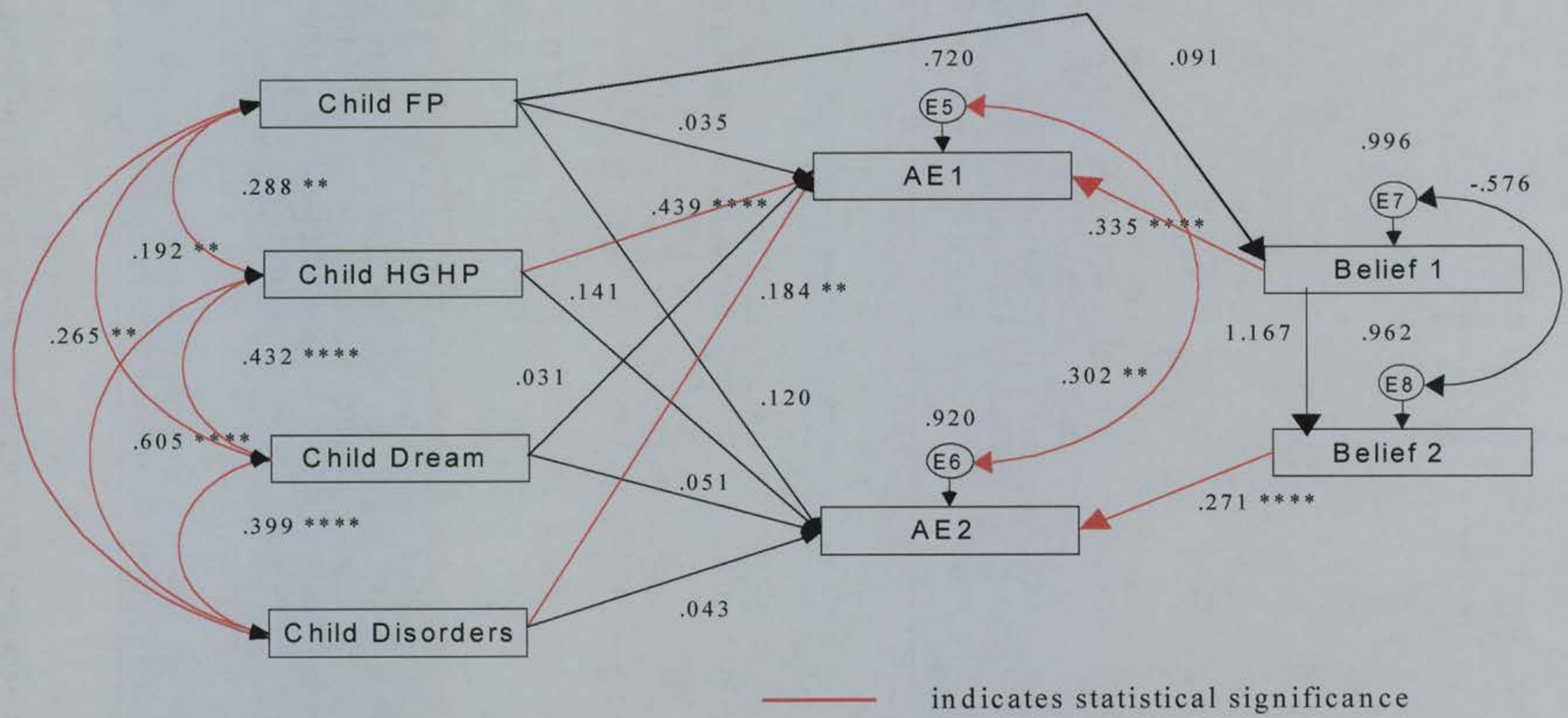


Table 60 Values of path coefficients for the final cognitive source model

Path	Unstandardised path coefficient (standardised)	Robust standard error	Robust z score	*p* value
Child FP-AE1	.007 (.035)	.014	0.54	0.2946
Child HG/HP-AE1	.197 (.439)	.038	5.13	$p < 0.00002$
Child dream-AE1	.014 (.031)	.039	0.37	0.3537
Child disorders-AE1	.104 (.184)	.045	2.33	0.0099
Child FP-AE2	.012 (.120)	.008	1.39	0.0823
Child HG/HP-AE2	.029 (.141)	.024	1.22	0.1112
Child dream-AE2	.011 (.051)	.019	0.57	0.2843
Child disorders-AE2	.011 (.043)	.027	0.42	0.3372
Belief1-AE1	.244 (.335)	.048	5.11	$p < 0.00002$
Belief2-AE2	.087 (.271)	.022	3.86	0.00006
Child FP-Belief1	.026 (.091)	.025	1.05	0.1469
Belief1-Belief2	1.211 (1.167)	.878	1.38	0.0838
Path	**Covariance (correlation)**	**Robust standard error**	**Robust z score**	***p* value**
Child FP-HG/HP	.432 (.288)	.175	2.47	0.0068
Child FP-dream	.279 (.192)	.118	2.36	0.0091
Child FP-disorders	.315 (.265)	.123	2.55	0.0054
Child HG/HP-dream	.297 (.432)	.062	4.77	$p < 0.00002$
Child HG/HP-disorders	.341 (.605)	.067	5.12	$p < 0.00002$
Child dream-disorders	.218 (.399)	.054	4.03	0.00003
E5-E6	.013 (.302)	.005	2.70	0.0035
E7-E8	-.015 (-.576)	.230	-0.67	0.2514

Associations

Figure 29 and Table 60 show that, as predicted and supported by the WWW survey data, there were significant positive correlations among the childhood fantasy proneness, hypnagogic/hypnopompic, dream and sleep disorder symptoms measures.

The magnitude of these correlations was identical to those in the experiential source model. There was also a positive correlation between the residual errors for the anomalous experience measures (.335). However, unlike the WWW survey sample, the error variances for the anomalous beliefs measures were negatively correlated (-.576).

Direct relationships

As predicted and as supported by the WWW survey data, childhood hypnagogic/hypnopompic experiences and sleep disorder symptoms were significant positive predictors of the incidence of non-UFO-related anomalous experiences. Again, the path coefficient between childhood fantasy proneness and non-UFO-related anomalous experiences was in the predicted direction but in this case it was definitely not approaching significance ($p = 0.2946$). Unlike the WWW survey data, and contrary to expectation, the childhood dream experience measure was not a significant predictor of the measure of non-UFO-related anomalous experiences; in addition, the childhood HG/HP experiences measure was not a significant positive predictor of the measure of UFO-related anomalous experiences in this sample. As with the experiential source model, the magnitude of the path coefficients was quite small (0.031-0.439) and the childhood HG/HP experience measure was the best of the childhood predictors.

The childhood predictors and the respective anomalous beliefs measure accounted for almost the same (48% vs. 49%) proportion of the variance in the non-UFO-related anomalous experiences measure and a relatively larger (15% vs. 9%) proportion of the variance in the UFO-related anomalous experiences measure in this sample.

As predicted, the levels of non-UFO-related and UFO-related anomalous beliefs were significant positive predictors of their respective experiences, although the magnitude of the UFO-related path coefficient (0.271) was twice as big as that for the WWW sample (0.135).

As with the WWW sample and both tests of the experiential source model, the models are much better at explaining variance associated with non-UFO-related rather than UFO-related measures of anomalous experiences and beliefs.

Unlike the WWW survey data, the level of childhood fantasy proneness was a small (.091) but nonsignificant direct positive predictor of the level of adult belief in non-UFO-related anomalous phenomena. The level of belief in non-UFO-related phenomena was also a nonsignificant positive predictor of the level of belief in UFO-related anomalous phenomena.

With this sample of data, the final solution accounted for a smaller proportion of the variance (1% vs. 3%) in the level of adult belief in non-UFO-related phenomena and in the level of UFO-related beliefs (7% vs. 12%).

Indirect relationships

The modified model suggests that childhood fantasy proneness only has an indirect effect on the incidence of non-UFO-related anomalous experiences via its effect on belief in non-UFO-related phenomena. This contradicts Irwin's (1992, 1993a) suggestion that fantasy proneness may have a direct as well as an indirect effect on paranormal beliefs.

Comparison of cognitive source model fit for the WWW and traditional pencil-and-paper survey samples

In summary, the final solution of the cognitive source model, containing the correlated error variances and the addition of a direct path between the non-UFO-related and UFO-related anomalous beliefs measures and between the childhood fantasy proneness and non-UFO-related anomalous beliefs measures, provided a good fit to the data in both the WWW and traditional pencil-and-paper samples, although the fit was slightly better for the WWW sample. In addition, the model accounted for similar proportions of variance in the anomalous experiences and beliefs measures, with a slightly greater proportion of variance being accounted for in the UFO-related measures for the traditional pencil-and-paper survey sample.

The main differences between the solutions for the WWW and traditional pencil-and-paper samples is that in the latter the significant positive paths between the childhood fantasy proneness and the non-UFO-related anomalous beliefs measures, between the childhood dream experiences measure and the non-UFO-related anomalous experience measure, between the childhood HG/HP and UFO-related anomalous experiences measures and between the error variances for the anomalous beliefs measures were not replicated.

Thus, although the model fit and proportions of variance accounted for have been replicated by the traditional pencil-and-paper sample, the magnitude of some of the individual paths within the model have not been replicated.

Test of the reciprocal causation model

Model specification

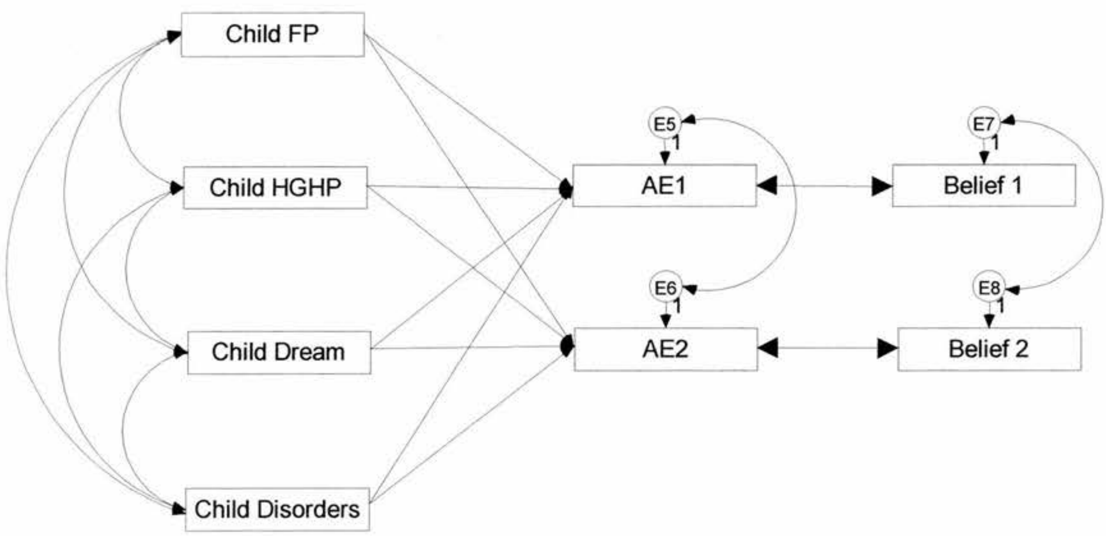


Figure 30 Diagram of the revised reciprocal causation model

a) residuals

An examination of the residual covariance matrix for this revised reciprocal causation model found that the residuals were small (average off-diagonal absolute standardised residuals = 0.0539) which is a sign of a good model fit. Six residuals had an absolute magnitude greater than 0.1.

b) model chi-square

The model chi-square value (see Table 61) indicated that there was no significant difference between the data and the proposed model, which is therefore supportive of the model. The Satorra-Bentler Scaled chi-square value is also non-significant and supportive of the proposed model. The indices of fit were all greater than 0.9 which also confirms that the revised reciprocal causation model provides a good fit to the data. However, the slightly higher chi-square values and the slightly lower indices of model fit show that the model fits the WWW survey data slightly better than it does the traditional pencil-and-paper survey data.

Table 61 Measures of fit for the revised reciprocal causation model

Measures of fit	Value	df	p
Independence model chi-square value	330.864	28	$p < .001$
Model chi-square value	10.739	8	$p = 0.2169$
Satorra-Bentler Scaled chi-square value	11.804	8	$p = 0.1602$
χ^2 difference test	320.125	20	$p < .001$
χ^2 difference test (Scaled)	319.060	20	$p < .001$
Bentler-Bonett Normed Fit Index (NFI)	0.968		
Bentler-Bonett Non-normed Fit Index (NNFI)	0.968		
Comparative Fit Index (CFI)	0.991		

Post-hoc analyses

i) Lagrange multiplier test

The Lagrange multiplier test suggested adding a path between the childhood dream experiences and the UFO-related anomalous beliefs measure (multivariate χ^2 (1, N=139) = 4.742, p = 0.029) but the probability of this statistic fell below the p < .01 criterion for acceptance and so this modification was not made. No additions were made in the analysis of the WWW survey data either (apart from allowing covariances between the error variances of the anomalous experiences and beliefs measures, respectively).

ii) Wald test

The Wald test suggested the removal of six paths: one between the childhood dream experiences and non-UFO-related anomalous experiences measures (multivariate χ^2 (1, N=139) = 0.160, p = 0.689); one between the childhood fantasy proneness and non-UFO-related anomalous experiences measures (multivariate χ^2 (2, N=139) = 0.416, p = 0.812); one between the childhood sleep disorder symptoms and UFO-related anomalous experiences measures (multivariate χ^2 (3, N=139) = 0.651, p = 0.885); one between the childhood dream experiences and UFO-related anomalous experiences measures (multivariate χ^2 (4, N=139) = 0.969, p = 0.914); one between the UFO-related anomalous experiences and UFO-related anomalous beliefs measures (multivariate χ^2 (5, N=139) = 2.015, p = 0.847); and one between the childhood fantasy proneness and UFO-related anomalous experiences measures (multivariate χ^2 (6, N=139) = 4.258, p = 0.642)

Table 62 Measures of fit for the revised reciprocal causation model with and without suggested modifications

Post hoc modification	Model χ^2	Satorra-Bentler Scaled χ^2	Bentler-Bonett NFI	Bentler-Bonett NNFI	CFI
Model prior to Lagrange and Wald suggested modifications	10.739 df = 8 $p = 0.2169$	11.804 df = 8 $p = 0.1602$	0.968	0.968	0.991
Deletion Childhood dream experience to non-UFO-related anomalous experiences	10.998 df = 9 $p = 0.2758$	11.301 df = 9 $p = 0.2557$	0.967	0.979	0.993
Deletion Childhood sleep disorders symptoms to UFO-related anomalous experiences	11.241 df = 10 $p = 0.3391$	11.423 df = 10 $p = 0.3255$	0.966	0.989	0.996
Deletion Childhood fantasy proneness to non-UFO-related anomalous experiences	11.620 df = 11 $p = 0.3928$	11.744 df = 11 $p = 0.3832$	0.965	0.995	0.998
Deletion Childhood dream experience to UFO-related anomalous experiences	12.122 df = 12 $p = 0.4360$	12.111 df = 12 $p = 0.4368$	0.963	0.999	1.000
Deletion UFO-related anomalous experiences to UFO-related anomalous beliefs	71.997 df = 14 $p < .001$	70.945 df = 14 $p < .00001$	0.782	0.617	0.809

iii) Results of suggested modifications

Table 62 shows that the deletion of the paths suggested by the Wald test did not improve the fit to a great extent and, in fact, worsened it slightly according to the model chi-square values and the NFI fit index. Further deletion of the path between the UFO-related experiences and beliefs measures resulted in a lack of fit between the model and the data and thus there was no point in considering deleting any further paths. However, as deletion of these suggested paths did not result in any clear improvements to the model fit, they were not included in the final model solution.

Figure 31 Diagram of the results of the SEM for the final version of the reciprocal causation model

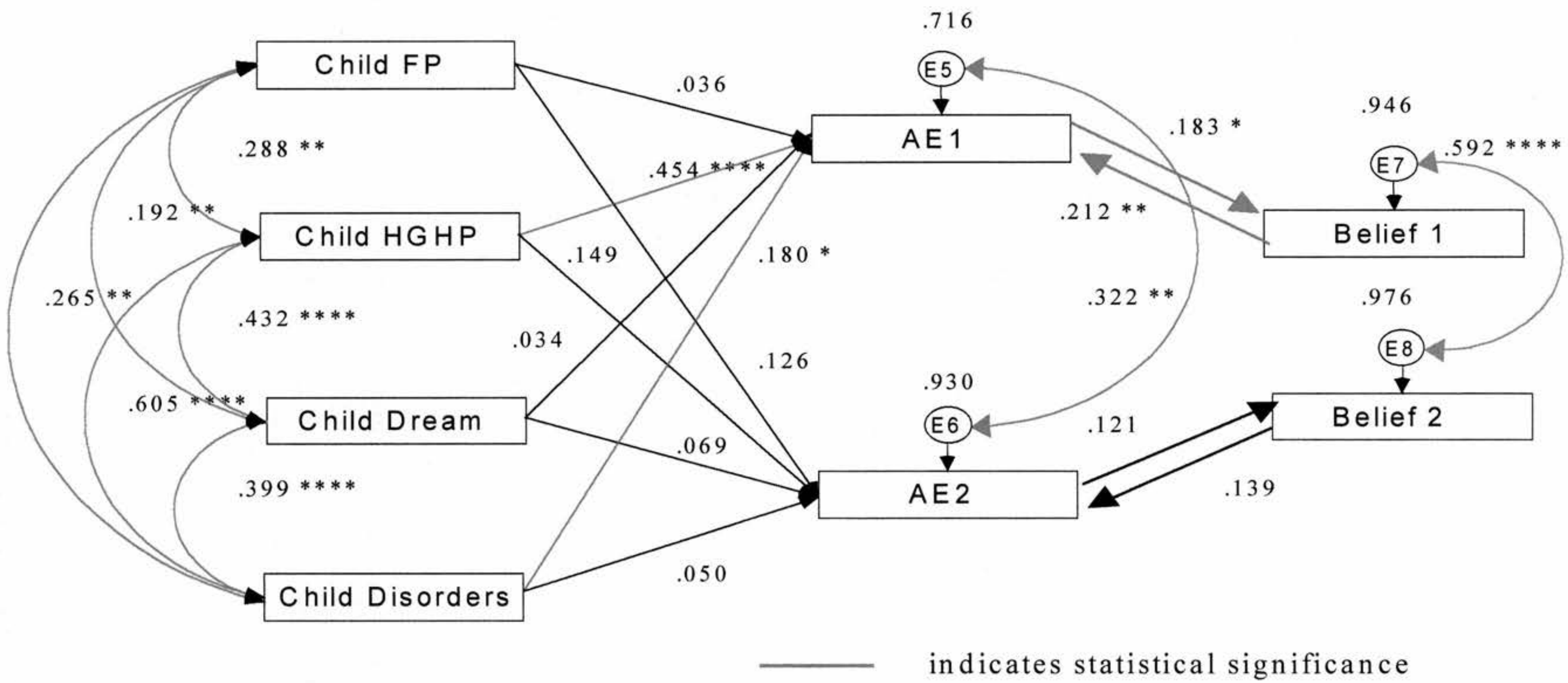


Table 63 Values of path coefficients for the final reciprocal causation model

Path	Unstandardised path coefficient (standardised)	Robust standard error	Robust z score	*p* value
Child FP-AE1	.008 (.036)	.014	0.56	0.2877
Child HG/HP-AE1	.208 (.454)	.037	5.56	$p < .00002$
Child dream-AE1	.016 (.034)	.040	0.40	0.3446
Child disorders-AE1	.104 (.180)	.046	2.26	0.0119
Child FP-AE2	.012 (.126)	.009	1.42	0.0778
Child HG/HP-AE2	.030 (.149)	.024	1.26	0.1038
Child dream-AE2	.014 (.069)	.019	0.76	0.2236
Child disorders-AE2	.013 (.050)	.027	0.47	0.3192
AE1-Belief1	.241 (.183)	.124	1.94	0.0262
Belief1-AE1	.160 (.212)	.066	2.43	0.0075
AE2-Belief2	.375 (.121)	.340	1.10	0.1357
Belief2-AE2	.045 (.139)	.040	1.12	0.1314

Path	Covariance (correlation)	Robust standard error	Robust z score	*p* value
Child FP-HG/HP	.432 (.288)	.175	2.47	0.0068
Child FP-dream	.279 (.192)	.118	2.36	0.0091
Child FP-disorders	.315 (.265)	.123	2.55	0.0054
Child HG/HP-dream	.297 (.432)	.062	4.77	$p < .00002$
Child HG/HP-disorders	.341 (.605)	.067	5.12	$p < .00002$
Child dream-disorders	.218 (.399)	.054	4.03	0.00003
E5-E6	.014 (.322)	.005	2.77	0.0028
E7-E8	.148 (.592)	.022	6.85	$p < .00002$

Associations

Figure 31 and Table 63 show that, as predicted, there were significant positive correlations among the childhood fantasy proneness, hypnagogic/hypnopompic, dream and sleep disorder symptoms measures. The magnitude of these correlations was identical to those in the other models tested. There were also significant positive correlations between the residual errors for the anomalous experiences (0.322) and anomalous beliefs (0.592) measures which suggest that there are additional variables, not specified in the model, that can account for variability in both non-UFO-related and UFO-related experiences and beliefs, respectively.

Direct relationships

As predicted and as supported by the WWW survey data, childhood hypnagogic/hypnopompic experiences (0.454) and sleep disorder symptoms (0.180) were both significant positive predictors of the non-UFO-related anomalous experiences measure. The standardised path coefficients for the childhood predictors also indicated that the childhood HG/HP experience measure is the best of these at predicting the overall incidence of non-UFO-related anomalous experiences. Unlike the WWW survey data, neither the childhood fantasy proneness nor the measure of childhood dream experiences were significant positive predictors of the measure of non-UFO-related anomalous experiences nor were they anywhere near approaching statistical significance. None of the childhood measures were significant positive predictors of the measure of UFO-related anomalous experiences; with the WWW survey data the childhood HG/HP experiences measure was.

The childhood predictors plus the respective anomalous beliefs measure accounted for approximately the same proportion (49% vs. 48%) of the variance in the non-UFO-related anomalous experiences measure but twice as much (14% vs. 7%) of the variance in the UFO-related anomalous experiences measure. This is only approximate as it does not take the correlations between the residual errors into account.

As predicted, the non-UFO-related anomalous experiences measure was a significant positive predictor (0.183) of the level of non-UFO-related beliefs and vice versa (0.212). However, contrary to expectations, the reciprocal paths between UFO-related anomalous experiences and beliefs were small and nonsignificant but in the predicted direction. These paths were also small and nonsignificant in the WWW sample.

The anomalous experience measures accounted for about the same (11% vs. 13%) of the variance in the level of adult belief in non-UFO-related phenomena as in the WWW sample but slightly more (5% vs. 1%) of the variance in the level of UFO-related beliefs, respectively. Again, this model is much better at explaining variance relating to non-UFO-related rather than UFO-related phenomena measures and is better at explaining variance in non-UFO-related anomalous experiences rather than beliefs.

There is support for the reciprocal causation hypothesis that suggests that reports of anomalous experiences might cause anomalous beliefs and that anomalous beliefs might also cause reports of anomalous experiences, which supports Irwin's (1992, 1993a) model. However, this only applies here to non-UFO-related measures.

Indirect relationships

As predicted and supported by the WWW survey data, the childhood hypnagogic/hypnopompic experience and sleep disorder symptoms measures were also indirect predictors of non-UFO-related anomalous beliefs via their association with the incidence of non-UFO-related anomalous experiences. The indirect relationship between childhood fantasy proneness and non-UFO-related anomalous experiences is again supportive of part of Lawrence's (1998; Lawrence et al., 1995) model of the childhood antecedents of paranormal beliefs.

Comparison of reciprocal causation model fit for the WWW and traditional pencil-and-paper survey samples

In summary, the final solution of the reciprocal causation model containing the correlated error variances provided a good fit to the data in both the WWW and traditional pencil-and-paper samples, although, as with the other models, the fit was slightly better for the WWW sample. In addition, the model accounted for similar proportions of variance in the non-UFO-related anomalous experiences and beliefs measures but a much greater proportion of variance was accounted for in the UFO-related measures for the traditional pencil-and-paper survey sample.

The main differences in the solutions for the WWW and traditional pencil-and-paper samples are that in the latter the significant positive paths between the childhood fantasy proneness and the non-UFO-related anomalous experiences measures, between the childhood dream experiences measure and the non-UFO-related anomalous experience measure, and between the childhood HG/HP and UFO-related anomalous experiences measures were not replicated.

Thus, although the model fit and proportions of variance accounted for have been replicated by the traditional pencil-and-paper sample, the magnitude of some of the individual paths within the model has not been replicated.

Overall comparisons of fit for the WWW and traditional pencil-and-paper survey models

Although the original specifications did not fit the data, all of the revised versions of the models provided a good fit to the data in both the WWW and traditional pencil-and-paper samples (see Tables 64 & 65). Although the degree of fit was slightly lower for the traditional pencil-and-paper survey data, the indices of fit, and to a lesser extent, the model chi-square values were fairly similar across the two samples. This suggests that the fit of the models was quite robust, at least for these two samples, even though they had used different data-collection methods.

The indices of fit (NFI, NNFI, CFI) show that the revised cognitive source (CS) and reciprocal causation (RC) models provided the best fit to the WWW survey and traditional pencil-and-paper survey data and the levels of fit were very high (range 0.961-1.029). However, the revised experiential source (ES) model also provided a very good fit to the data in both surveys. The chi-square measures of fit also indicated that the CS and RC models provided the best fit to the data in both samples, although the values were lower for the CS model than the RC model in the WWW survey. This suggested that the CS model provided a slightly better fit, but the reverse was true for the traditional pencil-and-paper survey, although the difference was much smaller. The model chi-square values were slightly smaller for the WWW survey data than the traditional pencil-and-paper survey data, which also suggests that the models provided a better fit to this data than the traditional pencil-and-paper data.

All of the final models were generally very good at explaining variance in the non-UFO-related anomalous experiences measure but accounted for considerably smaller proportions of variance in the UFO-related anomalous experiences measure. In both samples, the models accounted for approximately 38-49% of the variance in the non-UFO-related and approximately 7-15% of the variance in the UFO-related anomalous experiences measure. The CS and RC models were the best at accounting for variance in the anomalous experience measures in both samples. The ES and RC models were the best at accounting for variance (c.15-18% and 11-13%, respectively) in the non-UFO-related anomalous beliefs measure; the CS model accounted for only 1-3% in the two samples. The CS model was best at accounting for variance in the UFO-related anomalous beliefs measure (7% and 12%) but this is not surprising given that this model contained an additional direct path from the non-UFO- to the UFO-related beliefs measure. The proportion of variance accounted for in the non-UFO-related anomalous measure was closely replicated across the two samples; the proportion for the other anomalous experiences and belief measures were in the same area but were more variable.

Overall comparison of the descriptive statistics for the WWW and traditional pencil-and-paper surveys

Table 66 shows that the mean scores for the WWW sample were all greater than those for the traditional pencil-and-paper sample. The variance of the scores was also greater for the WWW sample, apart from the variance of the beliefs measures. These differences in the variances were statistically significant for all of the measures, apart from the UFO-related beliefs measure, according to the Levene test for equality of variances. Mann-Whitney tests revealed that there were significant differences in the scores for the WWW and traditional pencil-and-paper samples with the exception of the UFO-related anomalous experiences measure, which was nevertheless approaching significance ($p = 0.08$). Thus, there are significant differences in the

Table 64 A comparison of the measures of fit for the final solutions for the experiential source, cognitive source and reciprocal causation models (WWW survey data)

Measure of fit	Experiential source model	Cognitive source model	Reciprocal causation model
Model χ^2	10.222, df= 9, p= 0.333	4.687, df= 8, p= 0.790	7.548, df= 8, p= 0.479
Satorra-Bentler Scaled χ^2	10.211, df= 9, p= 0.334	5.016, df= 8, p= 0.756	7.626, df= 8, p= 0.471
Bentler-Bonett NFI	0.976	0.989	0.982
Bentler-Bonett NNFI	0.991	1.029	1.010
CFI	0.997	1.000	1.000
Estimate of proportion of variance accounted for			
Non-UFO-related anomalous experiences	38%	49%	48%
UFO-related anomalous experiences	7%	9%	7%
Non-UFO-related anomalous beliefs	18%	3%	13%
UFO-related anomalous beliefs	2%	12%	1%

Table 65 A comparison of the measures of fit for the final solutions for the experiential source, cognitive source and reciprocal causation models (traditional pencil-and-paper survey data)

Measure of fit	Experiential source model	Cognitive source model	Reciprocal causation model
Model χ^2	12.448, df= 9, p= 0.189	11.386, df= 8, p= 0.181	10.739, df= 8, p= 0.217
Satorra-Bentler Scaled χ^2	13.558, df= 9, p= 0.139	12.770, df=8, p= 0.120	11.804, df= 8, p= 0.160
Bentler-Bonett NFI	0.962	0.966	0.968
Bentler-Bonett NNFI	0.965	0.961	0.968
CFI	0.989	0.989	0.991
Estimate of proportion of variance accounted for			
Non-UFO-related anomalous experiences	42%	48%	49%
UFO-related anomalous experiences	10%	15%	14%
Non-UFO-related anomalous beliefs	15%	1%	11%
UFO-related anomalous beliefs	7%	7%	5%

Table 66 A comparison of descriptive statistics for the measures collected via the WWW and traditional pencil-and-paper data collection methods

Measure	Mean		Variance	
	WWW	Traditional	WWW	Traditional
Child FP	3.50	2.69	5.99	3.17
Child HGHP	2.80	2.25	0.98	0.71
Child dream	3.13	2.56	0.91	0.67
Child sleep disorder symptoms	2.64	2.32	0.65	0.45
Non-UFO AE	1.94	1.43	0.33	0.16
UFO AE	1.15	1.11	0.05	0.03
Non-UFO beliefs	1.58	1.20	0.13	0.27
UFO beliefs	1.30	0.95	0.25	0.29

typical scores and the variability of the scores across the two samples. This could reflect differences in the samples and/or the differences in the survey administration method but, in my opinion, the former is more likely to be the case.

The equivalence and explanations for the descriptive statistics, factor analysis and SEM analysis findings using both the WWW and traditional pencil-and-paper survey data will be discussed in Chapter 11.

Chapter 11

Discussion of tests of proposed models using structural equation modelling (SEM)

The purpose of this chapter is to discuss the findings of the tests of the proposed models using SEM techniques and data from the WWW and traditional pencil-and-paper surveys and to assess the extent to which the WWW findings have been successfully replicated using a traditional pencil-and-paper data collection technique.

The equivalence of WWW versus traditional pencil-and-paper survey data

Before discussing these findings, it is necessary to consider what features are required in order to demonstrate the equivalence of measures across different modes of administration. Assuming that everything apart from the mode of administration remains constant, the variables measured should have similar measures of central tendency and dispersion, the factor structure should be the same, and the variables should correlate with other variables to the same extent (APA, 1986; Buchanan & Smith, 1999). In terms of the SEM analyses, an ideal replication would result in similar model chi-square and fit indices values, similar magnitudes for the standardised path coefficients within the models, and similar proportions of variance accounted for in the criterion variables.

The first thing to note when considering the equivalence of the results from the WWW and traditional pencil-and-paper surveys is that not everything is equal (see Table 66, p. 315); there are clear differences between the two samples that suggest that they are drawn from different populations. Although this is a disadvantage in terms of trying to establish the equivalence of the measures, if the factor structure and the fit of the proposed models are similar with both samples then this suggests that the findings are quite robust and generalise to more than one population. In order to compare the equivalence of WWW-based versus traditional pencil-and-paper measures empirically, one would ideally wish to conduct a repeated-measures study in which participants completed both formats of the questionnaire in a counterbalanced manner under identical controlled conditions. However, this would be difficult in that one would really need two alternate forms of the measure; if one used the same measure then the results might be affected by familiarity and/or practice as well as the test-retest reliability of the measure itself. It is likely that such a design would prevent the use of a representative sample from the WWW-user population because of the practicalities of arranging for them to complete both formats under identical conditions. However, a compromise might be to use an opportunity sample, for example students, who would probably be able to complete both formats under similar conditions. Alternatively, one could use an unrelated design in which one group of participants completed a pencil-and-paper version of the questionnaire and one group completed a WWW-version, ideally under the same controlled conditions, such as in a laboratory. However, the difficulty with this design is that one needs to ensure that the two groups do not differ in other ways that could affect the results. This would be difficult to achieve if one wanted to use a sample drawn from the population of WWW users as such a sample may have particular biases in terms of its demographics. Although the picture is constantly changing, recent estimates suggest that two-thirds of WWW users are male and that they tend to be white, in their late teens to early thirties, with above average education and socio-economic status, and tend to be in educational, professional or managerial contexts (see Buchanan & Smith, 1999; The GVU Center, 1998; Schmidt, 1997; Stanton, 1998). However, as can be seen below, the sex bias in the WWW sample collected in this research is atypical in that the majority of the participants are female.

The WWW and traditional pencil-and-paper samples are similar in terms of the range and average age of the participants and in terms of their bias towards female participants. Possible explanations for the large proportion of female participants might be that women have a greater interest in the paranormal and/or sleep-related experiences or that they might be more willing to report these kinds of experiences. There is certainly some evidence to suggest that females are generally more likely to believe in anomalous/paranormal phenomena than males (see review by Irwin, 1993a).

In terms of the UCN psychology student population, there is also a greater number of females than males and this would be reflected in the sampling of such a population. A sizeable proportion of the participants (c.65% WWW, 41% traditional pencil-and-paper) had or were practising some form of mental discipline, exercise or self-improvement program. The two samples differed considerably in terms of the nationalities of the participants; the WWW sample had a much greater range but almost two-thirds were American and only 14% British. In contrast, 96% of the traditional pencil-and-paper participants were British. The WWW participants are also likely to have a greater knowledge and/or interest in parapsychology, which may have influenced their responses to items relating to this area. Some of these differences are likely to be a function of the different ways that the participants were recruited; the WWW participants were all visitors to the KPU website and completed and submitted the questionnaire electronically via a computer; the traditional pencil-and-paper participants were mainly UCN staff or students recruited via e-mail or via invitation in classes and all of these participants completed and submitted the questionnaire manually. Clearly neither of these samples are representative of the normal population and so generalisability will be limited.

Descriptive statistics for the WWW and traditional pencil-and-paper measures

A comparison of the descriptive statistics for the measures used in the SEM analyses shows that the WWW sample produced higher mean scores on all of the measures and also higher variances, with the exception of the anomalous beliefs measures (see Table 66, p. 315). These differences could be due to the fact that the samples are drawn from different populations and/or the differences in the survey administration and completion methods. Although the descriptive statistics differ across the WWW and traditional pencil-and-paper samples, the factor structure of the measures and the degree of model fit are reasonably well replicated; this is quite reassuring and suggests that the results may be quite robust despite differences in the administration and completion method and differences in the demographics of the samples. Although the number of studies that have compared the equivalence of WWW versus traditional pencil-and-paper measures is small (see Chapter 6), some previous research has also found that there might be differences in the descriptive statistics even though the factor structure and the internal consistencies are comparable in both samples (Davis, 1999; Pasveer & Ellard, 1998; Stanton, 1998). Another study by Buchanan and Smith (1999) also found no differences in the factor structure or internal consistencies but found no differences in the means either; in fact, as with my data, they found that their model provided a better fit to the WWW sample. As Stanton (1998) and Pasveer and Ellard (1998) correctly pointed out, these differences in the descriptive statistics could simply reflect the greater heterogeneity within the WWW sample rather than the differences in the administration and completion of the measures.

Principal factor analysis of survey items

Principal factor analysis with oblique rotation of the anomalous experiences and anomalous beliefs items, with both the WWW and traditional pencil-and-paper samples, suggested that each of these two measures ought to be split into two separate measures relating to non-UFO and UFO-related phenomena. The alpha coefficient of reliability for these separate anomalous beliefs measures was very good and was approximately 0.9 in both samples. Although the reliability of the non-UFO-related experiences measure was good (>0.8 in both samples), the reliability of the UFO-related experiences measure was slightly below the accepted criterion on 0.7 (Kline, 1994) for the WWW sample and was very poor for the traditional pencil-and-paper sample (<0.2). This poor reliability is likely to be a function of the small number of items in the scale and the low variance of the scores on these items, especially in the traditional pencil-and-paper sample.

A similar factor analysis of the childhood sleep-related items suggested that these ought to be split into three separate measures: childhood HG/HP experiences, childhood dream experiences, and childhood sleep disorder symptoms. The reliability of these measures was generally greater than 0.7 in both samples, with the exception of the childhood HG/HP measure in the traditional pencil-and-paper sample, which had an alpha coefficient of 0.69.

Principal factor analysis of the childhood fantasy proneness items in the WWW survey identified one clear factor that was subsequently utilised and found to be internally reliable (0.76). However, this factor structure was less clear in the traditional pencil-and-paper survey and the reliability of the measure was not as high as anticipated (0.62).

Nevertheless, generally-speaking, the factor structure of the survey items was confirmed by the traditional pencil-and-paper survey, although the structure of the childhood fantasy proneness was less-clear. Other studies have also found that the factor structure and internal consistencies of measures replicates across WWW and pencil-and-paper administration methods (Buchanan & Smith, 1999; Davis, 1999; Pasveer & Ellard, 1998; Stanton, 1998). However, the poor reliability of the UFO-related anomalous experiences measure in the traditional pencil-and-paper sample suggests that any of the findings relating to this measure should be treated with extreme caution.

Tests of models using structural equation modelling (SEM)

Before interpreting the results of the SEM analyses, it is necessary to point out some important limitations of such analyses. Firstly, one must remember that SEM is based on an analysis of variances and covariances associated with variables within a given model and thus, in itself, cannot indicate causality. In order to demonstrate causality, one would need to rule out the influence of other variables and show that the cause preceded the effect (Bullock et al., 1994). This latter point concerning the order of cause and effect raises another problem with some SEM analyses, such as those conducted in this thesis. Although SEM is often used to analyse cross-sectional designs (MacCallum & Austin, 2000), the fact that all measures are taken on a single occasion means that in reality there may not have been the necessary time lag required for a cause to operate and an effect to appear. Although, this is a valid point, there is a 'pseudo-time-lag' in the models being tested here in that the main predictors on one side of the models refer to childhood experiences whereas criterion variables on the far side of the models, i.e., the level of anomalous beliefs, refer to adulthood. Clearly, in this instance, a longitudinal design would be preferable but it would be difficult to recruit the large number of child participants needed for the multivariate analysis and still maintain enough participants for the follow-up that would have to be done in adulthood. SEM analyses could be complemented by qualitative approaches that analyse verbal interviews and narratives and which may gain insights into the processes involved with the development of beliefs and how these may operate over time. There has been very little research of this kind looking into the topic of anomalous beliefs.

With SEM, one must also remember that a given model that fits a sample of data should not be considered to be definitive because there may be alternative versions of the model that provide an equivalent or even better fit to the data (see Breckler, 1990; Bullock et al., 1994). As will be seen later, this point is nicely illustrated by the findings of this thesis. In their review of recent applications of SEM in psychological research, MacCallum and Austin (2000) noted that many researchers tend not to, or are reluctant to, consider alternative models and tend to be prejudiced towards one particular model. However, this thesis has attempted to evaluate three alternative models. Another point well-made by MacCallum and Austin (2000) is that "a finding of good fit does not imply that a model is correct or true, but only plausible." (p. 218). SEM is an iterative process that attempts to converge upon an optimal solution based upon the model specified and the data available. Thus, even if a model is found to fit a sample of data one should always attempt to cross-validate the factor structure and the fit of the model using different data samples (Hoyle & Panter, 1995; MacCallum, 1995; MacCallum & Austin, 2000; Neill et al., 1999). Cross-validation is particularly important if one has made post hoc modifications to a model, which might have capitalised on chance idiosyncrasies.

A final point to make is that, when interpreting the results of SEM one must avoid focusing entirely on model fit and one should also consider the magnitude and statistical significance of individual paths within the model plus the amount of variance accounted for in the criterion variables. Just because a model fits a sample of data it does not necessarily follow that the path coefficients within it will be large.

Moving onto the results of the SEM analyses, although the original model specifications did not fit the data, all of the revised versions of the models provided a good fit to the data in both the WWW and traditional pencil-and-paper samples. Although the degree of fit was slightly lower for the traditional pencil-and-paper survey data, the indices of fit, and to a lesser extent, the model chi-square values were fairly similar across the two samples. This suggests that the fit of the models was quite robust, at least for these two samples, even though they had used different data-collection methods.

The indices of fit (NFI, NNFI, CFI) show that the revised cognitive source (CS) and reciprocal causation (RC) models provided the best fit to the WWW survey and traditional pencil-and-paper survey data and the levels of fit were very high (range 0.961-1.029). However, the revised experiential source (ES) model also provided a very good fit to the data in both surveys (range 0.962-0.997). The chi-square measures of fit also indicated that the CS and RC models provided the best fit to the data in both samples. Although the values were lower for the CS model than the RC model in the WWW survey, which suggested that the CS model provided a slightly better fit, the reverse was true for the traditional pencil-and-paper survey, although the difference was much smaller. The model chi-square values were slightly smaller for the WWW survey data than the traditional pencil-and-paper survey data, which also suggests that the models provided a better fit to this data than the traditional pencil-and-paper data.

All of the final models were generally very good at explaining variance in the non-UFO-related anomalous experiences measure but accounted for considerably smaller proportions of variance in the UFO-related anomalous experiences measure. In both samples, the models accounted for approximately 38-49% of the variance in the non-UFO-related and approximately 7-15% of the variance in the UFO-related anomalous experiences measure. The CS and RC models were the best at accounting for variance in the anomalous experience measures in both samples. The ES and RC models were the best at accounting for variance (c.15-18% and 11-13%, respectively) in the non-UFO-related anomalous beliefs measure in the two samples but the CS model accounted for only 1-3%. The CS model was best at accounting for variance in the UFO-related anomalous beliefs measure (7% and 12%) but this is not surprising given that this model contained an additional direct path from the non-UFO- to the

UFO-related beliefs measure. In summary, the proportion of variance accounted for in the non-UFO-related anomalous measure was closely replicated across the two samples; the proportion for the other anomalous experiences and belief measures were in the same area but were more variable.

The relationship between anomalous experiences and anomalous beliefs

In relation to the first aim of this thesis, it is not as easy as one would have hoped to decide whether anomalous beliefs should best be modelled as an outcome of anomalous experiences, an antecedent of anomalous experiences, or whether the relationship is reciprocal. This is because the final versions of all three models fit the data well in both the WWW and traditional pencil-and-paper samples. Based upon empirical criteria, one is inclined to favour the RC and ES models, although, of these two, the RC model provided the better fit, accounted for greater proportions of variance and contained the least number of post hoc modifications (and was therefore the least data-driven model). This also seems theoretically sensible given that the separate paths between experiences and beliefs are supported by the ES and CS models. Although the CS model provided a very good fit to the data in both samples, in both cases the fit was dependent upon the addition of a single direct path from the non-UFO-related anomalous beliefs to the UFO-related beliefs measure which, in my opinion, should be viewed with some caution. If such a path is of such key importance one might have expected it to be strongly suggested by the Lagrange multiplier test used with the other models; this was not the case. Acceptance of the RC and ES models provides support for both Irwin's (1992, 1993a) reciprocal causation and Lawrence's (1998; Lawrence et al., 1995) experiential source hypotheses for the relationship between measures of paranormal experiences and beliefs. Although Lawrence (1998) found a good deal of support for his experiential model using SEM analysis, he did not test a reciprocal causation version; had he done so he might also have found that this also fitted his data.

One should note, however, that the models tested as part of this thesis did not account for as much variance in the beliefs measures as the model tested by Lawrence;

the RC and ES models in this thesis accounted for less than 20% of the variance in the non-UFO-related beliefs and less than 10% of the UFO-related beliefs. Although Lawrence's ES model included measures of paranormal rather than anomalous experiences and beliefs, tests of his model with paranormal experiences as the sole predictor of paranormal beliefs, accounted for 29% (Lawrence et al., 1995), 46% (Lawrence, 1998, SPR survey) and 54% (Lawrence, 1998, Edinburgh survey) of the variance in paranormal beliefs, according to my calculations. One reason for the substantially greater proportion of variance accounted for in the SPR and Edinburgh surveys may be that , in these analyses, Lawrence (1998) used a latent measure of paranormal belief based upon scores on two observed paranormal belief scales. Combining more than one measure to form a latent factor minimises the overall measurement error thus leading to a more accurate measure; this may have provided a greater proportion of 'true;' variance to be explained. Nevertheless, there are other factors, not specified in these models, which will account for the remainder of this variance.

In terms of the models tested as part of this thesis, the magnitude and statistical significance of the standardised path coefficients for the direct paths between the anomalous experiences and beliefs measures show that in all cases the path coefficients between the non-UFO-related measures (range .183-.485) were greater than those between the UFO-related measures (.053-.272); in fact in the RC model the reciprocal paths between the UFO-related measures were small and positive but non-significant. In all cases, a higher frequency of anomalous experiences was associated with a higher level of anomalous beliefs and vice versa. However, one should recall that the relationships between the UFO-related measures might have been attenuated by the small variance in the anomalous experiences measure and the unreliability of the anomalous beliefs measure, particularly in the traditional pencil-and-paper sample.

So how might anomalous experiences and beliefs be mutually causal? In my opinion, experiences are likely to have a greater impact on our anomalous beliefs when we don't really have such beliefs or, if we do, they are not very strong or fully-formed. Childhood anomalous experiences that seem genuine could thus shape our positive beliefs in anomalous phenomena at an early age. Similarly, childhood anomalous experiences that are shown not to be genuine could shape our disbelief in such phenomena. Once our beliefs have been established, it is possible that they might influence how we interpret our future life experiences. With hindsight, it seems that trying to solve the question of the causal nature of the relationship between anomalous experiences and beliefs using only cross-sectional and quantitative techniques may have been somewhat overambitious. Perhaps the direction of the relationship is dependent upon whether or not one already has well-developed beliefs and what stage of life one is at? It is bound to be somewhat difficult to establish clear causal directionality when using a cross-sectional design; what is needed is a complementary qualitative approach to this question. One of the advantages of qualitative over quantitative approaches is that they take the context into account and can collect detailed information about how events affect people (e.g., Richardson, 1996; Smith, Harré, & Langenhove, 1995). Textual and verbal reports may also give a clear sense of the order of events in terms of time, which may help to clarify the direction of potential causality. Longitudinal measures used in a SEM analysis would also be likely to give a clearer resolution of the nature of any potential causal relationships between anomalous experiences and beliefs but, as mentioned earlier, such a study would be difficult to conduct for practical reasons.

As outlined in Chapter 2, a number of surveys have found that personal experience is one of the most common reasons that people give for holding beliefs in anomalous or paranormal phenomena (Blackmore, 1984; Clarke, 1995; Milton, 1992). Unfortunately, what these surveys do not provide is much detail concerning what it was about the experiences that influenced the beliefs, what the circumstances were, and what the people's beliefs were prior to the experience. One question that has not yet been answered, or really asked, is whether it tends to be a single experience that has the greatest influence upon our beliefs and whether subsequent experiences continue to reinforce them. Many studies, including those within this thesis, assume that there is a linear relationship between experiences and beliefs, i.e., the more experiences you have the greater your beliefs. However, if the relationship is not this simple and straightforward then linear modelling techniques, such as SEM, might give spurious results. Nevertheless, my view is that anomalous experiences can still lead to the development and/or reinforcement of beliefs in anomalous phenomena.

Upon reflection, I am becoming increasingly convinced that perhaps we are trying to run before we can walk when it comes to trying to explain and model the causes of belief in anomalous phenomena and it is necessary to go back to basics. We need to establish a better consensus as to what we mean by anomalous or paranormal beliefs, what should or should not be included in measures of such beliefs and to get a much deeper and richer understanding of the impact of anomalous experiences on a person's life (regardless of whether or not they involve genuine anomalous processes). More crucially, it is necessary to identify exactly what it is about experiences that causes subsequent changes and how these come about. As measures of anomalous/paranormal beliefs seem to be multidimensional, my recommendation for helping to resolve disagreements over the scope of the measures, and to create a practically useful measure with good ecological validity, would be to collect more qualitative information about the types of experiences considered anomalous or paranormal from a wide range of people. As with the creation of any psychometric measure, it is a good idea to begin with a large number of items that are believed to fully cover the domain of interest. Pilot testing and factor and item analysis can then establish the factor structure and which items are most reliable. My suspicion is that a number of subscales would emerge. Researchers with differing views regarding the scope of the concept could then select those subscales that seemed valid for their purposes.

What explanations are there for the notion that beliefs in anomalous phenomena can cause us to report more anomalous experiences? Well, clearly there is a requirement that such beliefs have been established and this could possibly be due, at least in part, to personal experience. Thus, both directions of influence could affect a person but possibly at different times in their life. If a person believes in anomalous phenomena then they might be more likely to attribute personal experiences as being anomalous than a person who is indifferent or one who disbelieves in such phenomena. In addition, a person who has strong beliefs in anomalous phenomena might be more likely to place themselves in situations in which potential anomalous experiences might occur; for example, they might be more likely to test their own psychic abilities or to visit a psychic or healer or an apparently haunted location. Also, experimental evidence from sheep-goat studies (e.g., Lawrence, 1993, 1998; Palmer, 1971) suggests that one's belief may affect one's performance at controlled ESP tasks with believers tending to perform better than chance and disbelievers worse than chance. If, as the cognitive deficits hypothesis argues (see Irwin, 1993a, 1999), one's beliefs in anomalous phenomena are partly the result of relatively poor cognitive abilities then it may be that it is these cognitive deficits that lead us to misinterpret normal experiences as being anomalous rather than the beliefs per se.

There is also evidence to suggest that one's beliefs or knowledge may shape one's experience leading to experiences that could be given an anomalous interpretation; for example, in Chapter 2, there was a description of a case in which a man experienced HG/HP imagery of aliens trying to insert a probe into his body after he had seen a film about alien abductions.

Fantasy proneness, anomalous experiences and anomalous beliefs

Apart from their disagreement over the nature of the relationship between paranormal experiences and beliefs, Irwin (1992, 1993a) and Lawrence (1998; et al., 1995) also disagree as to the nature of the relationship between fantasy proneness and paranormal beliefs (see Chapter 3). Although they both agree that there is an indirect positive relationship between them, via the relationship between fantasy proneness and paranormal experiences, Irwin (1992, 1993a) also argues for an additional direct path between fantasy proneness and paranormal belief.

Lawrence et al. (1995) tested a simplified version of Irwin's model and found that it did not fit the data; they also found that deletion of the direct path between fantasy proneness and paranormal belief (plus the addition of a direct path between childhood trauma and paranormal experiences) led to a much improved fit. In two subsequent studies, Lawrence (1998) found that this revised and simplified version of Irwin's model was cross-validated and provided a good fit to the data in both samples. The simplified version of Irwin's model that did contain a direct path between fantasy proneness and paranormal beliefs did in fact fit the data obtained in Lawrence's (1998) Edinburgh survey, although the fit was not as good as Lawrence's version, which did not contain such a path. However, even though Irwin's model provided a good fit to that sample overall, the magnitude of the fantasy proneness to paranormal beliefs path was very small (0.041) and statistically nonsignificant. So, in conclusion, Lawrence's' (1998) findings support models with only an indirect relationship between fantasy proneness and paranormal beliefs via reports of paranormal experiences.

The initial versions of the ES, CS and RC models tested in this thesis contained a similar indirect relationship between measures of childhood fantasy proneness and the non-UFO and UFO-related anomalous beliefs via their respective measures of anomalous experiences but they did not contain additional direct pathways. Only in the case of the CS model did the Lagrange multiplier test suggest that the addition of an extra direct path between childhood fantasy proneness and measures of anomalous beliefs would lead to a significant improvement in model fit; in the WWW sample this test suggested the addition of a direct path from the childhood fantasy proneness to the non-UFO-related anomalous beliefs measure. Tests of the ES and RC models, using the WWW sample, suggested the addition of direct paths to both anomalous beliefs measures but neither of these paths was calculated to provide a significant improvement to the fit of the model.

Although final solutions of the CS model containing the direct childhood fantasy proneness to non-UFO-related anomalous beliefs path provided a good fit to the data from both samples, the path coefficient for this extra path was small in both cases and only statistically significant using the WWW survey data. In conclusion then, the results of my SEM analyses support Lawrence's (1998; et al., 1995) findings that fantasy proneness is best modelled as only having an indirect relationship with anomalous/paranormal beliefs via its relationship with associated experiences.

What about evidence for the direct path between childhood fantasy proneness and measures of anomalous experiences? Versions of the ES, CS and RC models, which contained such paths, all provided a very good fit to the data in both samples. However, closer scrutiny of the path coefficients within these models revealed that, although in the predicted direction, the magnitude of the path coefficient between childhood fantasy proneness and the measure of UFO-related anomalous experiences was small (.090-.132) and nonsignificant (although $p < .12$ in all cases) in the final versions of all three models across both samples. Path coefficients for the direct path between childhood fantasy proneness and the measure of non-UFO-related anomalous experiences measure were all small (.035-.146) and in the predicted direction but were only statistically significant in the WWW sample versions of the ES and RC models. The reason for these small and mostly nonsignificant pathways is most likely to be the fact that the childhood fantasy proneness measure is significantly positively correlated with the childhood measures of HG/HP experiences and sleep disorder symptoms, both of which are significant positive predictors of non-UFO-related anomalous experiences in all of the models tested. Thus, in my view, fantasy proneness most probably would have had a significant positive relationship with the anomalous experiences measures if the models did not contain measures of these childhood sleep-related experiences but the trends suggest that the effects of fantasy proneness become fairly negligible once the effects of these other variables are taken into account. The link between fantasy proneness and HG/HP experiences was noted by Wilson and Barber (1983) when they originally conceptualised fantasy proneness. The relationship between fantasy proneness and childhood sleep-related experiences will be discussed later. Thus, the results of this research do not disconfirm previous studies that have found links between fantasy proneness and reports of non-UFO-related anomalous experiences (e.g., Alvarado & Zingrone, 1994; Council &Huff, 1990; Myers & Austrin, 1985; Rao, 1992), it is just that these other studies did not also consider the effects of possible covariates of fantasy proneness, such as HG/HP experiences. Certainly in-depth interviews with Wilson and Barber's (1983) fantasy-prone participants confirmed that many of them had experienced HG/HP as well as a range of paranormal experiences.

The finding that childhood fantasy proneness is not a significant predictor of UFO-related experiences is supportive of most previous empirical research (e.g., Ring & Rosing, 1990; Rodeghier, 1994; Rodeghier et al., 1991; Spanos et al., 1993) but contradicts the results of one retrospective study (Bartholomew et al., 1991).

However, there is evidence that individuals who are more fantasy prone tend to report more intense UFO-related experiences (Spanos et al., 1993). Nevertheless, one must be careful when one is trying to interpret the findings in this thesis because there is an important difference between these studies and the other aforementioned studies; in the other studies at least one of the samples consisted of people who had all reported some kind of UFO experience whereas in my studies very few people had reported such experiences. The low variance in the UFO-related experience measure may have attenuated the potential magnitude of the relationship with the childhood fantasy proneness measure.

So, what are the possible explanations for the relationship between childhood fantasy proneness and reports of non-UFO-related anomalous experiences? One possibility is that the cognitive abilities associated with fantasy proneness, such as absorption capacities, dissociative tendencies and hypnotic susceptibility, which are all related to each other to some extent (e.g., Barrett, 1992; Council & Huff, 1990; Kihlstrom et al., 1994; Lynn & Neufeld, 1996; Lynn & Rhue, 1988; Myers & Austrin, 1985; Rhue & Lynn, 1989, 1991; Spanos et al., 1995), might be conducive to anomalous processes (Irwin, 1992; Lawrence et al., 1995), such as ESP or communication with the dead. Fantasy prone individuals might also be able to enter ASCs, such as the HG/HP states, more easily; many reports of anomalous experiences occur during ASCs. Another possible explanation for this relationship is that the tendency to engage in vivid fantasising and the occasional difficulties with reality discrimination that have been associated with fantasy proneness (e.g., Lynn & Rhue, 1988; Rhue & Lynn, 1991; Wilson & Barber, 1983) might lead to misinterpretations of normal imaginary experiences.

Relationship between childhood fantasy proneness and childhood sleep-related experiences

Tests of the ES, CS and RC models across both the WWW and traditional pencil-and-paper samples revealed that, as predicted, there were significant positive intercorrelations among the childhood fantasy proneness, HG/HP experiences, dream experiences and sleep disorders symptoms measures. The relationships between childhood fantasy proneness and the sleep-related experiences measures were generally smaller (range r = 0.192-0.288) than the relationships among the childhood sleep-related measures (range r = 0.399-0.605).

These results support Wilson and Barber's (1983) finding that fantasy prone people are more likely to report HG/HP imagery and many have done so since early childhood. As will be seen later, their suspicion that these variables may be linked to reports of anomalous experiences was also supported by findings in this thesis. It is not surprising to find that childhood fantasy proneness is associated with the other sleep-related measures either. Previous research has found that people who report higher levels of fantasy proneness also tend to report greater dissociative tendencies (e.g., Rauschenberger & Lynn, 1995; Rhue et al., 1995). Thus, people high in fantasy proneness and/or dissociative tendencies might be more likely to enter dissociated states of consciousness. It seems that such dissociated states can also occur during and around the time of sleep (see Mahowald & Schenck, 1991) when wakefulness and sleep stages (either REM and/or NREM) become mixed. These dissociated states can result in experiences such as HG/HP imagery and sleep paralysis, REM sleep behaviour disorder, lucid dreaming, night terrors and sleepwalking. Fantasy proneness has also been found to be linked to hypnotic susceptibility (e.g., Council & Huff, 1990; Lynn & Rhue, 1988; Rhue & Lynn, 1988, 1991; Siuta, 1990; Wilson & Barber, 1983) and absorption (Council & Huff, 1990; Lynn & Neufeld, 1996; Myers & Austrin, 1985; Rhue & Lynn, 1989). The fact that fantasy proneness, dissociative experiences, hypnotic susceptibility and absorption are all inter-related to some extent and that fantasy proneness and dissociative experiences have been linked with sleep-related experiences suggests that people with higher levels of fantasy proneness may find it easier to enter and become absorbed in waking and sleep-related ASCs. A number of other researchers have also noted the relationships among many of these variables and their links with reports of anomalous experiences (e.g., Targ et al., 2000; McClenon, 1994a; Thalbourne & Delin, 1994; Zingrone & Alvarado, 1994).

It seems to me that the correlations among the childhood fantasy proneness and the childhood sleep-related experiences measures provide some support for new dimensions of personality, such as boundary structure (Hartmann, 1991) and transliminality (Thalbourne & Delin, 1994). As noted in Chapter 3, the theory behind both of these dimensions suggests that there may be boundaries between different states or cognitive processes or sources of information and that the permeability of these boundaries, and therefore the ease of transfer across or through them, may differ across people. I would argue that people who score highly on the childhood fantasy proneness and sleep-related experiences measures are likely to have thin boundaries and a high level of transliminality; this is worthy of investigation in the future. Research has also found that people with thin boundaries spend a lot of time daydreaming and fantasising, they find it easy to become absorbed in such activities and, in some circumstances, they find it difficult to distinguish between imagination and reality (Hartmann, 1991); these are all characteristics of the fantasy prone personality. People with thin boundaries also seem to have more flexible divisions between states of consciousness; for example, they report relatively slow and gradual transitions between wakefulness and sleep and vice versa, more states that are difficult to classify as being either waking, NREM or REM sleep, and more HG/HP imagery (Hartmann, 1991). They also report dreams and lucid dreams that tend to be more vivid, detailed, emotional and bizarre (Hartmann, 1991; Hartmann et al., 1998) and more nightmares, although people who report other sleep disorders, such as sleep apnea, periodic limb movements, bruxism or night terrors, have been found to have thicker boundaries (Hartmann, 1991).

Fantasy proneness and absorption have recently been confirmed as being a component of transliminality (Thalbourne et al., 1997; Thalbourne & Houran, 2000) although measures of dissociative experience have not. People with high transliminality tend to report more daydreaming and greater tendencies to introspect and to experience ASCs (Thalbourne & Houran, 2000); they are also more likely to attribute meaning to their inner processes and mentation (Thalbourne & Delin, 1994).

Thus, in summary, it seems that people who have thin boundaries and/or high transliminality find it easier to enter ASCs, can move fairly gradually from one state to another and may experience mixed states of consciousness, possibly containing one or more elements of wakefulness, NREM or REM sleep. They tend to pay attention to their internal state and they can experience a lot of imagery and mentation that they often recall and attempt to make sense of. As both thin boundaries (Richards, 1996) and transliminality (Thalbourne & Delin, 1994; Thalbourne et al., 1997; Thalbourne & Houran, 2000) have been correlated with measures of paranormal experiences, it would appear that these dimensions are conducive to reports of such experiences.

Relationship between childhood sleep-related experiences and reports of anomalous experiences

Given that fantasy proneness and reporting HG/HP, dream experiences and some sleep disorder symptoms seem to be closely related to the concepts of boundary structure and transliminality, which have both been related to reports of anomalous experiences, one would expect the aforementioned variables to also be related to measures of anomalous experiences. This was the second aim of this thesis. In fact there was strong support for some aspects of this prediction in the models tested here. In tests of all three models, using both the WWW and traditional pencil-and-paper survey data, the final solutions showed that the childhood HG/HP (range .317-.490) and sleep disorder symptoms (range .176-.219) measures were significant positive predictors of the measure of non-UFO-related anomalous experiences in all cases. The childhood HG/HP measure was also a significant positive predictor (range .154-.160) of the UFO-related anomalous experiences measure but only for the models tested using the WWW sample; the paths were all of a similar magnitude (.141-.155) but non-significant, albeit in the predicted direction, in the traditional pencil-and-paper sample. The childhood dream experiences measure was also a small significant positive predictor of the non-UFO-related experiences measure in the CS (.124) and RC (.119) models, and was approaching significance ($p = 0.0505$) in the ES (.112) model but only for the WWW sample; this path was always in the predicted direction (.031-.038) but nonsignificant in the traditional pencil-and-paper sample.

The question is why might people who are able to enter and move between sleep-related ASCs quite easily report more anomalous experiences? There are two main (and not necessarily mutually exclusive) possibilities: (1) these ASCs are conducive to the operation of anomalous processes or agencies; (2) features of these states, perhaps combined with individual characteristics, may result in misinterpretations of experiences. This is similar to the view held by Blackmore and Rose (1997); however, they argued more specifically that it is the potential for confusion between reality and imagination that seems to be the key. In particular, they cited lucid dreams, false awakenings, HG/HP imagery, and sleep paralysis as circumstances in which there can be confusion between reality and imagination. All of these sleep-related experiences have been associated with reports or measures of a variety of anomalous experiences (Blackmore, 1983, 1984, 1986; Glicksohn, 1989; Green, 1968; Green & McCreery, 1994; Gurney et al., 1886; Mavromatis, 1987; McCreery, 1993; McClenon, 1994a; Rose & Blackmore, 1996; Rose et al., 1997; Spanos et al., 1993; Van Eeden, 1913).

Firstly, the question of why the HG/HP and sleep states might be conducive to genuine anomalous processes or agencies will be considered. These states can share a number of features of what is considered to be a psi-conducive state (Braud & Braud, 1975; Honorton, 1977; Mavromatis, 1987); for example, conscious awareness, physical relaxation, a reduction in sensory distraction and increased internal attention. However, the emphasis seems to be that these conditions might facilitate detection and recognition of the operation of anomalous processes rather than facilitating their operation, though the latter might also be a possibility.

Although particular patterns of EEG brain activity seem to be associated with the appearance of HG/HP, REM and NREM sleep (e.g., Dement & Kleitman, 1957; Hori et al., 1994; Stickgold & Hobson, 1994) there does not appear to be any kind of EEG signature that marks the occurrence of experiences reported as involving anomalous processes. There is some evidence from experimental attempts to induce or monitor OBEs during sleep-related states that suggests that such OBEs tend to take place during the HG state or the transition to stage 2 sleep and that these may be associated with some unusual EEG activity and/or some flattening of EEG activity (Tart, 1967, 1968, 1969a; Krippner, 1996). There is also evidence to suggest that the EEG traces of OBErs are interrupted by brief periods of wakefulness (Tart, 1967, 1968, 1969a; Twemlow, 1977). However, it does not follow that this evidence is necessarily indicative of the operation of anomalous processes.

Some researchers (e.g., Murphy, 1966; Parker, 1975) have argued that it might not be the ASC per se but the degree of the transition from one state to another, or the rapidity of the transition, which is important for the emergence of reports of anomalous experiences. Perhaps the occurrence of states that are a mixture of sleep and wakefulness is necessary. This might be a circumstance in which there is some confusion between reality and imagination (Blackmore & Rose, 1997). There is a need for experimental sleep research to monitor and gain mentation reports specifically from these mixed states rather than from the more discrete states that have tended to be the focus of research in the past. Such an approach would enable us to see if there is any difference in mentation between the more clear-cut states either side of the mixed state and the mixed state itself.

Even if certain sleep-related brain activity and/or changes in states or the appearance of mixed states are conducive to reports of anomalous experiences, whether genuine or not, it would seem that they are not a sufficient requirement; if they were then many more people would be reporting anomalous experiences possibly on a fairly regular basis. Perhaps there is an interaction between the ASC, other characteristics of the individual, such as their level of fantasy proneness, transliminality or boundary structure, and the environment?

Another body of literature contains theories that suggest that some sleep-related and some anomalous experiences might be the result of interactions between bodily processes, more specifically activity in the temporal lobes of the brain, and environmental variables, more specifically the earth's geomagnetic field. Two researchers who have been pioneering the investigation of links between the temporal lobes and reports of anomalous experiences are Neppe (e.g., 1983a, 1984, 1990) and Persinger and colleagues (e.g., Persinger, 1989; Persinger & De Sano, 1986; Persinger & Makarec, 1987). Persinger and colleagues have also conducted a number of studies looking at relationships between geomagnetic field activity (GMF) and the incidence of a range of anomalous experiences (e.g., Gearhart & Persinger, 1986; Berger & Persinger, 1991; Persinger & Krippner, 1989; Persinger & Schaut, 1988).

Important functions of the temporal lobes, which are relevant to a discussion of links with both anomalous experiences and normal sleep-related experiences, are integration of multimodal perceptual inputs of all kinds, the attribution of meaning and emotional significance to external and internal experiences and integrating one's sense of self (Neppe, 1990; Persinger, 1989). Thus, they seem to be involved with bringing together and making sense of information associated with a range of sensory modalities that can come from both internal and external sources.

Research has found that people who report a greater number of indicators of possible anomalous temporal lobe functioning also tend to report more paranormal and mystical experiences (Neppe, 1983, 1984, 1990; Persinger & Makarec, 1987; Perisnger & De Sano, 1986; Persinger & Valliant, 1985). The measures of these indicators have some validity in that they are based upon clinical features associated with temporal lobe epilepsy patients (Neppe, 1983, 1990) and have been correlated with temporal lobe EEG activity in non-clinical samples (Makarec & Persinger, 1987).

In my view, converging evidence for a link between temporal lobe activity, anomalous experiences and GMF activity comes from a number of findings: (1) it appears that epileptic seizures are more likely during periods of increased GMF activity (Rajaram & Mitra, 1981); (2) periods of lower GMF activity have been associated with alleged reports of precognitive dreams (Krippner, Vaughan, & Spottiswoode, 2000; but not by Persinger & Schaut, 1988), spontaneous case reports of telepathy-clairvoyance (Persinger & Schaut, 1988; Schaut & Persinger, 1985) and experimental telepathy-clairvoyance performance (Berger & Persinger, 1991; Persinger & Krippner, 1989); however there is also evidence to suggest that spontaneous cases of precognition or post-mortem experiences are not associated with periods of lower GMF activity (Persinger & Schaut, 1988; Schaut & Persinger, 1985). According to Krippner et al. (2000), the reason why Persinger and Schaut failed to find such a relationship is that the dates of the precognition experiences are unreliable, which would therefore potentially alter the associated GMF values. This seems a reasonable explanation; (3) periods of higher GMF activity have been associated with reports of poltergeists and hauntings (Gearhart & Persinger, 1986; Wilkinson & Gauld, 1993), reports of OBE-like experiences in participants with higher temporal lobe signs (Persinger, 1995) and experimental PK (Braud & Dennis, 1989); (4) the hourly incidence of epileptic seizures and some psi experiences appear to be similar with peaks occurring between 2-4am and 9-11pm (Persinger, 1989).

It has been suggested that patterns of anomalous temporal lobe functioning might be a trait with a continuum along which people may differ (Neppe, 1984; Persinger & Makarec, 1993) with temporal lobe (or complex partial) epileptics falling at one extreme. However, it is possible that the patterns of activity might only occur at certain times (Neppe, 1984), e.g., around the time of sleep or when there is a sudden change in GMF activity (Persinger, 1985) or within a certain range of GMF activity (Persinger, 1995). This idea that there may be an interaction with environmental variables is supported by the finding that the relationship between GMF activity and ESP task performance seems to depend upon local sidereal time (LST) and that the relationship may only hold within a certain range of the latter variable (Spottiswoode, 1997). LST is "the longitudinal-like astronomical correlate for the portion of the celestial sphere that is directly overhead at the time of the viewing." (Spottiswoode, 1997, p. 3).

Sleep and sleep-related states also seem to be related both to temporal lobe activity and to reports of anomalous experiences; there is also evidence to suggest that sleep and sleep experiences might be affected by GMF activity. Persinger & Schaut (1988) noted that the temporal lobes are particularly labile during dreaming and suggested that they may then become susceptible to environmental factors. Microseizures in the temporal lobes are normal and can occur regularly during REM sleep (Stevens, 1982); more drastic and widespread temporal lobe seizures are also more likely during sleep (Baldy-Moulinier, 1982). Temporal lobe epilepsy can disrupt the sleep-cycle; in some cases epileptic seizures can trigger or even replace REM sleep (Stevens, 1982). Temporal lobe patients can also suffer from sleep instability that is evidenced by numerous awakenings and shifts between sleep stages plus they can show increased wakefulness following sleep-onset (Baldy-Moulinier, 1982). One might postulate from this that people with labile temporal lobes might be more likely to experience mixed states of sleep and wakefulness, a greater degree of awareness during REM sleep (e.g., prelucid and lucid dreams) and experiences that might be associated with states that involve a mixture of wakefulness and NREM or REM sleep, particularly during increased GMF activity. In longitudinal studies of his own experiences, Conesa (1995, 1997) found that sleep paralysis episodes tended to occur during periods of higher GMF activity whereas extremely vivid dreams tended to occur during periods of lower GMF activity. Thus, it seems that the relationship between temporal lobe activity, GMF activity, sleep states and reports of anomalous experiences and normal sleep-related experiences is not a simple one; there may be interactions among them and/or there may be more than one mechanism or process involved. As Persinger (1989) correctly pointed out, the different directions for relationships between GMF activity and different anomalous experiences suggest that different processes might be involved for different experiences.

Deliberate stimulation or naturally-occurring but abnormal activity (as in the case of temporal lobe epilepsy) within the temporal lobes have also caused experiential features that have been reported during both anomalous experiences and normal sleep-related experiences. For example, Cook and Persinger (1997) have found that applying weak complex magnetic fields across and through the temporoparietal lobes can produce reports of a sense of presence and, in one case, a report of an OBE-like experience. Blackmore (1994) also reported feelings of floating during a session with Persinger in which both of her temporoparietal areas were stimulated. Interestingly, Neppe (1983) also mentioned a case in which the neurosurgeon Penfield (1955) induced an OBE in a temporal lobe epileptic patient by stimulating their temporal lobes. Sensations of floating have been reported during OBEs and NDEs (e.g., Alvarado, 1997b; Blackmore, 1982a; Green, 1968; Irwin, 1994c) as well as during normal HG/HP experiences (e.g., Isakower, 1938; Rowley et al., 1998). A sense of presence has also been associated with reports of apparitions and crisis apparitions—plus in some cases a feeling of coldness—(e.g., Green & McCreery, 1989; Gurney et al., 1886), some NDEs (e.g., Irwin, 1994c), the HG/HP states (e.g., Critchley, 1955; Ohayon et al., 1996) and reports of sleep paralysis (e.g., Conesa, 1995; Hufford, 1982; Rose & Blackmore, 1996; Spanos et al., 1995). It is also interesting to note that Cook and Persinger (1997) found that the nature of the sense of presence seems to alter according to the pattern of magnetic stimulation; burst-firing sequences tended to be associated with pleasant experiences whereas the

Thomas pulse tended to be associated with neutral or negative experiences. The Thomas pulse was also associated with sensations of unpleasant vibrations passing through the body, shivering and coldness and a sense of impending death. Similar vibrations have also been reported during the HG/HP states (Mavromatis, 1987) and during OBEs (e.g., Harary, 1978; McCreery & Claridge, 1996a); humming or vibrations are sometimes experienced at the beginning of alleged alien abduction experiences too (e.g., Mack, 1994). A sense of impending death or an unpleasant feeling that something's wrong or something bad is about to happen can also feature in crisis apparitional experiences (e.g., Gurney et al., 1886) and Type 2 false awakenings (e.g., Green & McCreery, 1994). Persinger (1993) has also argued that his analyses of the content of paranormal experiences have shown that there are many similarities, in terms of the themes and basic phenomenology, with experiences associated with stimulation of the temporal lobes.

The finding that different patterns of magnetic stimulation seem to generate different experiences strengthens the inference of a possible causal relationship. Persinger's explanation (e.g., Cook & Persinger, 1997) for the induced sense of presence is that the action of the magnetic field on the temporal lobes causes intercalation of the two hemispheres resulting in a temporary awareness of a right-hemispheric homologue of the left hemisphere's usual sense of self, i.e., one experiences a sense of another self that one might not recognise. Cook and Persinger (1997) argued that such intercalation is more likely during REM sleep; this could explain why a sense of presence is often reported during the HG/HP states and sleep paralysis, which seem to be associated with occasional intrusions of REM sleep into wakefulness or light sleep.

Having discussed the relationship between sleep-related experiences, temporal lobe signs and anomalous experiences, and between sleep-related experiences and fantasy proneness, it is also interesting to note that fantasy proneness also appears to be related to temporal lobe signs (Makarec & Persinger, 1987; Persinger & De Sano, 1986; Persinger & Makarec, 1993). In my view, the notion of temporal lobe lability and possible intercalation of the hemispheres seems to fit in with some aspects of the boundary structure (Hartmann, 1991) and transliminality (Thalbourne & Delin, 1994) theories. People with thin boundaries or high transliminality might have more labile temporal lobes that are more sensitive to stimulation, e.g., from environmental as well as internal stimulation, and the boundaries or thresholds for connection of the hemispheres might be lower meaning that intercalation might be more likely to occur. If this is the case then one would predict that temporal lobe epileptics ought to report very thin boundaries and/or a high level of transliminality; this is a prediction that is worthy of investigation. The idea of a transient awareness of a right hemisphere homologue of the self resulting in a sense of presence also fits in nicely with the notion of transliminality in "which the contents of some preconscious (or "unconscious" or "subliminal") region of the mind are able to cross the threshold into consciousness (or its sense of "awareness")." (Thalbourne & Delin, 1994, p. 3).

So it seems that activity within the temporal lobes might be one possible mechanism for the production of both anomalous experiences and normal sleep-related experiences and that this might also be linked to fantasy proneness. However, this does not tell us whether or not there are any genuine anomalous processes involved.

As outlined in Chapter 5, some of the best (and most reliable compared with spontaneous case reports) evidence for the conduciveness of sleep-related states to the operation of genuine anomalous processes comes from experiments that have been conducted under controlled conditions. Although experimental research into sleep-related anomalous experiences has focused on certain types of anomalous experiences, such as ESP and OBEs; I would also include psychomanteum research because of the similarities with the HG/HP states. It seems that ESP, OBEs and apparitions or communication with the dead are the types of anomalous experience that occur most often during sleep-related states, which is another reason for focusing upon them.

Having reviewed the experimental evidence for ESP occurring HG/HP and dream states, and having been both a participant and an experimenter in three dream ESP studies myself (Dalton et al., in press; Sherwood, Dalton et al., in press; Sherwood, Roe et al., submitted for publication), my conclusion is that the evidence is strongly suggestive of the operation of such a process, but not yet conclusive.

Very few experimental studies have attempted to investigate ESP during the naturally-occurring and self-induced HG/HP states (Braud, 1977; Gertz, 1983; White et al., 1971); although some of these studies obtained task performance that was significantly better than chance expectations, these studies involved small numbers of participants and/or trials and seemed to be somewhat exploratory. There were also some methodological problems, particularly with the Gertz (1983) study. These aspects, coupled with the general lack of attempts to replicate these findings, make it more difficult to conclude that there is a reliable effect operating. Although the evidence for a replicable, albeit small, ESP effect is much stronger if one considers the ganzfeld research (e.g., Honorton, 1986; Bem & Honorton, 1994; but see Hyman, 1986; Milton & Wiseman, 1999; Milton, 2000), in my view this cannot yet be counted as evidence for the psi-conducive nature of the HG state as it is not clear whether the ganzfeld procedure does induce a state resembling the HG state and. In fact, recent evidence suggests that it does not (Wackermann et al., 2000).

A greater number of experimental studies have investigated whether dreams are conducive to ESP (e.g., Braud, 1977; Child et al., 1977; Dalton et al., 2000; in press; Kanthamani & Broughton, 1992; Sherwood et al., 1999, in press; Ullman et al., 1989). Again, my conclusion is that the available evidence is strongly suggestive of the operation of ESP during dreams. This is supported by the fact that a recent meta-analysis of the Maimonides dream ESP trials found that the overall hit rate was 63% (MCE = 50%) with odds against chance of 75 million to one (Radin, 1997). Unfortunately, attempts to replicate the Maimonides findings have been few (Belvedere & Foulkes, 1971; Child, 1985; Foulkes et al., 1972; Globus et al., 1968) and they have been relatively unsuccessful (see Van de Castle, 1977) which is one of the most serious criticisms of the Maimonides findings (Krippner, 1991). One reason for the lack of attempted replications is the need for a sleep laboratory and the high costs involved with running such a study. However, recent studies using automated free-response ESP testing systems, but no sleep laboratory, have still managed to obtain promising results (e.g., Dalton et al., 2000, in press; Sherwood et al., in press). There is a need for an updated meta-analysis, which includes non-Maimonides studies, in order to see if there is overall evidence for dream ESP and whether the effect is dependent upon methodological or statistical aspects of the studies. There is also a need for more dream-ESP research, ideally using standardised protocols, to see if a replicable effect can be demonstrated across laboratories and across researchers. One way of achieving this might be to encourage laboratories that have developed, or are developing, automated ganzfeld testing systems to adapt them so that they can also be used in dream research. In my experience of this at the KPU, such research requires very little additional development and can be quite successful; this is something that we are also planning to implement at University College Northampton. One problem with dream-ESP studies to date is that, as with the investigations of ESP during naturally-occurring HG/HP states, there tend to be fairly small numbers of trials with small numbers of participants, which suggests that the power to detect any small effects may be fairly low. This is something that future dream ESP research also needs to address.

Turning to OBEs, although the available evidence, both from spontaneous cases and experimental investigations (see Chapter 5), suggests that the HG/HP and sleep states are conducive to reports of OBEs, this does not mean that any anomalous processes involving the separation of some form of the self from the physical body are necessarily involved. However, one recognises that some form of ESP might operate during some OBEs (see Alvarado, 1982, 1997b, 2000; Blackmore, 1982a; Palmer, 1978b). The evidence presented in Chapter 5 shows that there are many similarities between OBE and normal HG/HP experiences in terms of the conditions in which they occur and in terms of the content of the experiences. A likely explanation for OBEs that occur during the HG/HP states (and possibly also the sleep states) is that, as the psychological theories of OBEs (e.g., Blackmore, 1982a; Irwin, 1985b; Palmer, 1978b) and HG/HP imagery (see Mavromatis, 1987) suggest, normal sensory input and/or internal imagery becomes transformed into a complex and realistic experience in which the person maintains conscious awareness. The temporal lobes could play a role in the integration and interpretation of these inputs (Neppe, 1990; Persinger, 1989). Perhaps one of the key requirements, in addition to a shift away from external or internal inputs towards internal mentation (Blackmore, 1982a; Irwin, 1985b), is that the brain is attempting to process internal and external inputs during a state of consciousness that may be a mixture of sleep and wakefulness. Perhaps it is this process that disrupts one's normal sense of self and leads to confusion between internality and externality. In my view, HG/HP OBEs could be a special form of HG/HP imagery.

It seems to me that normal HG/HP-like imagery is also a more likely explanation for many alleged encounters with deceased loved ones that are reported inside psychomanteum chambers (see Arcangel, 1997; Hastings et al., 1999; Moody with Perry, 1993; Radin & Rebman, 1996; Roll & Braun, 1995). The psychomanteum context is possibly a good illustration of the reciprocal causation relationship between experiences and beliefs. As outlined in Chapter 5, the features of normal HG/HP experiences and the circumstances in which they occur are similar to many of the features of psychomanteum experiences and could be interpreted as being apparitional experiences and/or communication with the dead. Expectations regarding what will happen in the chamber plus a strong motivation for an encounter and a belief that it can and will occur are also likely to influence the content of the imagery experienced.

Another possible explanation for psychomanteum experiences is that the experient gains information about the deceased using some form of super-ESP (see Gauld, 1977). However, it is difficult to determine whether ESP is likely, based only on the subjective reports of the experients, because the information received tends to be quite general and/or could be information already known by the experient. One fairly obvious and more-controlled means of testing for possible ESP in a psychomanteum context would be to ask participants to gain information about a randomly-selected target during their time in the chamber. If they are able to identify the target more frequently than chance would predict then this would provide support for the argument that the information could have been obtained via ESP or perhaps via communication with the dead. Another theory put forward to account for psychomanteum experiences is that they are the result of a PK influence on the environment by the participants (Radin & Rebman, 1996). Radin and Rebman (1996) argue that the apparitions could be caused by short-term vortices caused by disturbances in an equilibrium between mind, body and environment. This theory was based upon their discovery of an apparent link between environmental and participants' physiological variables during the psychomanteum sessions and an almost significant positive correlation between a set of physiological variables and the output of an RNG placed outside the chamber. However, this theory is problematic for a number of reasons: (a) one needs to demonstrate that such an equilibrium exists an (b) that a disturbance in it causes the apparitional experience; (c) it is not clear how the mechanism specified would account for the individual features of the psychomanteum experience.

Why might normal sleep-related experiences be misinterpreted as involving anomalous processes? As my discussion of OBEs and psychomanteum experiences has illustrated (see Chapter 5), there are often similarities between the features of normal sleep-related experiences, particularly HG/HP, and reports of anomalous experiences and they may both occur in similar circumstances. It's been argued that HG/HP experiences may have been misinterpreted as ESP, apparitions, OBEs/NDEs, visions of previous lives or other worlds, alien abductions, witchcraft or attacks by spirits or demons etc. (Baker, 1992; Blackmore, 1996, 1998; Dahlitz & Parkes, 1993; Green & McCreery, 1994; Hufford, 1982; Leaning, 1925; Liddon, 1967; McKellar, 1957, 1989; Spanos et al., 1993, 1995; Wilson & Barber, 1983; Wing et al., 1994; Zusne & Jones, 1989). Apart from similarities in content, sleep-related imagery can be multisensory, vivid, detailed and very realistic. During sleep-related experiences people are often in bed in a darkened room and there may be reduced sensory input, which, according to Spanos et al. (1993), may interfere with accurate reality-testing, which is known to be reduced during the sleep onset period (Foulkes & Vogel, 1965). These conditions, coupled with the possibility of experiencing a mixed state of sleep and wakefulness, could lead to confusion between imagination and reality. It seems to me that normal HG/HP experiences are more likely to be misinterpreted than sleep experiences because the former are more frequently associated with a simultaneous awareness of the imagery as well as the current environment plus feelings of being awake. Although there may be perceptions of being awake (that may or may not be genuine) during prelucid and lucid dreams and false awakenings, conscious awareness appears to be less common during the sleep state than the HG/HP states.

Some of the best evidence for the misinterpretation of normal HG/HP experiences comes from reports of Old Hag attacks (e.g., Hufford, 1982), kanashibari (e.g., Fukuda et al., 1987) and ghost oppression attacks (Wing et al., 1994) which have similar, if not identical features to sleep paralysis with accompanying HG/HP imagery. Old Hag attacks are traditionally believed to be caused by a supernatural creature, by a human in spirit form or a combination of the two (Firestone, 1978; Hufford, 1982; Ness, 1978).; kanashibari and ghost oppression attacks are traditionally believed to be caused by evil spirits or possession by a ghost (Fukuda et al., 1987; Wing et al., 1994).

Other evidence illustrating the potential to misinterpret possible normal sleep-related experiences comes from the results of the Unusual Experiences Surveys conducted by the Roper Organization but interpreted by Hopkins et al. (1992). Participants who reported at least four out of five so-called indicator experiences were deemed to be possible UFO abductees. However, at least three of these indicator experiences (paralysis, a sense of flying and unusual lights) could be reported by a person who has normal HG/HP imagery. Stires (1993) goes even further and argues that a person could admit to all five without needing to consider a possible abduction scenario. Although these indicators have been reported during alleged abductions (e.g., Mack, 1994), the validity of the Unusual Experiences Surveys is still questionable because it is not clear that a specific set of indicators is a valid indicator of a potential abduction (Donderi, 1994; Goertzel, 1994). Also my own interpretation of the Roper reports suggests that a respondent could have been identified as a potential abductee even if his/her indicator experiences had occurred on separate occasions; this weakens their argument further.

In summary, there is evidence to suggest that the HG/HP and sleep states might be conducive to the operation of anomalous processes, such as ESP, but they may also be conducive to misinterpretations of normal experiences. The results of the SEM modelling suggest that people who report more frequent childhood HG/HP experiences, as opposed to childhood dream experiences, are more likely to report anomalous experiences throughout their lifetime.

Contributions made by this thesis

This thesis has tested three competing models, based upon those of Irwin (1992, 1993a) and Lawrence (1998; Lawrence et al., 1995), in order to establish whether anomalous beliefs should best be modelled as an outcome of anomalous experiences, as an antecedent of anomalous experiences, or whether the relationship is reciprocal. The multivariate structural equation modelling approach adopted by Lawrence was used to test these competing models and overcomes some of the problems with previous research into the correlates of anomalous/paranormal beliefs which has tended to be bivariate in nature. The results indicated that revised models of all three models tested with both WWW and traditional pencil-and-paper survey data, i.e., the experiential source (ES), cognitive source (CS), and reciprocal causation (RC), fitted the data to an acceptable extent. However, the RC model is considered to be the best of those tested for both theoretical and empirical reasons; this supports Irwin's rather than Lawrence's theory. This means that reports of anomalous experiences might lead to the development or reinforcement of anomalous beliefs and holding anomalous beliefs might also lead to a greater propensity to report anomalous experiences. The magnitude of these relationships is greater for non-UFO-related than UFO-related experiences/beliefs.

This thesis has also suggested that, as Lawrence has argued, fantasy proneness is best modelled as only having an indirect relationship with anomalous beliefs via its relationship with measures of anomalous experiences. This finding does not support Irwin (1992, 1993a) who argues for an additional direct relationship between fantasy proneness and measures of paranormal beliefs. However, although these models fit the data, childhood fantasy proneness is not a significant positive predictor of measures of anomalous experiences when the effects of other predictors in the model are taken into account. Measures of childhood HG/HP, in particular, and also sleep disorder symptoms were found to be significant positive predictors of the measure of non-UFO-related anomalous experiences. This supports the idea that the HG/HP states and possible dissociated sleep states are conducive to reports of anomalous experiences, either because the conditions facilitate the operation of anomalous processes or lead to misinterpretations of normal sleep-related experiences.

The measures of childhood fantasy proneness, HG/HP experiences, dream experiences and sleep disorder symptoms, as predicted, were found to be significantly correlated. This suggests that these people may have a tendency to experience imagery and an enhanced capacity to enter and become absorbed in altered states of consciousness (ASCs) and to be able to recall associated experiences. This thesis has also noted that this provides some support for the concepts of transliminality (Thalbourne & Delin, 1994) and boundary structure (Hartmann, 1991).

This thesis has also discussed evidence that suggests that temporal lobe brain activity might play a role in the production of both normal sleep-related experiences and anomalous experiences and that such experiences might also be the result of interactions with the earth's geomagnetic fields. It is argued that the notion of temporal lobe lability (Neppe, 1990; Persinger, 1989) and intercalation of the hemispheres also fit in with the theories behind transliminality and boundary structure.

The finding that the factor structure of the measures and the fit of the models and the proportion of variance accounted for were all generally replicated across two samples of data collected via WWW and traditional pencil-and-paper survey techniques suggests that the validity of the results is not adversely affected by the use of the WWW administration and completion methodology. It is argued that the differences in the descriptive statistics associated with the measures for the two samples are likely to be due to differences in the heterogeneity and demographics of the samples.

Suggestions for future research

1. Structural equation modelling

As the models tested did not account for all of the variance in the predicted variables, there is a need to include other variables. Future tests of similar models might examine the effects of including measures of transliminality and boundary structure as well as variables identified from future qualitative research into factors that influence the development of anomalous beliefs. Future research should continue to test competing models and attempt to cross-validate them using different samples. If possible future studies should use longitudinal rather than cross-sectional designs. In order to identify whether the models are particularly suited to certain types of experience of beliefs, future research could also employ specific rather than global measures of anomalous experiences and beliefs.

2. Definitions of terms and measures of experiences and beliefs

There is a need for more qualitative research to investigate what terms such as 'parapsychology', 'paranormal,' 'psychic,' and 'anomalous,' mean to the general population and which phenomena they associate with them and why. The results of this could be used to generate items that could form new measures of anomalous experiences and beliefs that might have greater ecological validity.

3. Anomalous experiences, normal sleep-related experiences, transliminality and boundary structure, temporal lobe signs and GMF activity

In the future, it would be useful to investigate whether transliminality and boundary structure are empirically related to each other and also to the sleep-related experiences included in this thesis. Given the hypothesised links between these variables and temporal lobe signs and anomalous experiences, it is necessary to establish whether temporal lobe epileptics report more normal HG/HP experiences, dream experiences and sleep disorders, as well as anomalous experiences. Given the hypothesised link between GMF activity and sleep-related experiences, there is a need to investigate whether there is a relationship between reports of HG/HP, dream experiences, sleep disorders and GMF activity and whether the nature of such a relationship is dependent upon LST.

4. The mechanisms involved with the development of anomalous beliefs

More qualitative research is needed, for example via open-ended or semi-structured interviews, in order to shed more light on the specific mechanism(s) by which anomalous experiences might lead to the development of beliefs and vice versa. It is also necessary to find out more about the factors that can influence beliefs, such as the views of others and the influence of the media and empirical evidence, and how the context might moderate this, and also how beliefs may develop and change over one's lifetime.

References

Alcock, J. E. (1981). *Parapsychology: Science or magic? A psychological perspective*. Elmsford, NY: Pergamon Press.

Allison, N. (1996). *Do you believe? The relationship between paranormal beliefs and fantasy proneness*. Unpublished BSc thesis, The University of Portsmouth.

Alvarado, C. S. (1982). ESP during out-of-body experiences: A review of experimental studies. *Journal of Parapsychology, 46*, 209-230.

Alvarado, C. S. (1987). Observations of luminous phenomena around the human body: A review. *Journal of the Society for Psychical Research, 54*, 38-60.

Alvarado, C. S. (1997a). Mapping the characteristics of out-of-body experiences. *Journal of the American Society for Psychical Research, 91*, 15-32.

Alvarado, C. S. (1997b). *Psychological and phenomenological characteristics of out-of-body experiences*. Unpublished doctoral thesis. University of Edinburgh, Scotland.

Alvarado, C. S. (1998a). ESP and altered states of consciousness: An overview of conceptual and research trends. *Journal of Parapsychology, 62*, 349-351.

Alvarado, C. S. (1998b). Sleepwalking and spontaneous parapsychological experiences: A research note. *Journal of Parapsychology, 62*, 27-63.

Alvarado, C. S. (2000). Out-of-body experiences. In E. Cardeña, S. J. Lynn, & S. Krippner (Eds.), *Varieties of anomalous experience: Examining the scientific evidence* (pp. 183-218). Washington, DC: APA.

Alvarado, C. S., & Zingrone, N. L. (1994). Individual differences in aura vision: Relationships to visual imagery and imaginative-fantasy experiences. *European Journal of Parapsychology, 10*, 1-30.

Alvarado, C. S., & Zingrone, N. L. (1997). Out-of-body experiences and sensations of "shocks" to the body. *Journal of the Society for Psychical Research, 61*, 304-313.

American Psychological Association (1986). *Guidelines for computer-based tests and interpretations*. Washington, DC: APA.

American Psychological Association (1998). *American Psychological Association*. [On-line]. Available HTTP: Hostname: www.apa.org Directory: about

American Sleep Disorders Association (ASDA). (1990). *International classification of sleep disorders: Diagnostic and coding manual (ICSD)*. Rochester, MN: Author.

Appelle, S., Lynn, S. J., & Newman, L. (2000). Alien abduction experiences. In E. Cardeña, S. J. Lynn, & S. Krippner (Eds.), *Varieties of anomalous experience: Examining the scientific evidence* (pp. 253-282). Washington, DC: APA.

Arcangel, D. (1997). Investigating the relationship between the Myers-Briggs Type Indicator and facilitated reunion experiences. *Journal of the American Society for Psychical Research, 91*, 82-95.

Ardis, J. A., & McKellar, P. (1956). Hypnagogic imagery and mescaline. *Journal of Mental Science, 102*, 22-29.

Arindel, W. A., & van der Ende, J. (1985). An empirical test of the utility of the observations-to-variables-ratio in factor and components analysis. *Applied Psychological Measurement, 9*, 165-178.

Arkin, A. M. (1991). Sleeptalking. In S. J. Ellman, & J. S. Antrobus (Eds.), *The mind in sleep: Psychology and psychophysiology* (2nd ed.) (pp. 415-436). New York: John Wiley.

Armstrong-Jones, R. (1920). Snapping of the brain. *Lancet, 11*, 720.

Arnold-Forster, M. (1921). *Studies in dreams*. London: Allen & Unwin.

Atkinson, R. P. (1994). Relationships of hypnotic susceptibility to paranormal beliefs and claimed experiences: Implications for hypnotic absorption. *American Journal of Clinical Hypnosis, 37*, 34-40.

Baddia, P., Wright, Jr., K. P., & Wauquier, A. (1994). Fluctuations in single-Hertz EEG activity during the transition to sleep. In R. D. Ogilvie, & J. R. Harsh (Eds.), *Sleep onset: Normal and abnormal processes* (pp. 201-218). Washington, DC: American Psychological Association.

Baker, R. A. (1992). *Alien abductions or human productions? Some not so unusual personal experiences*. Unpublished manuscript.

Baldy-Moulinier, M. (1982). Temporal lobe epilepsy and sleep organization. In M. B. Sterman, M. N. Shouse, & P. Passouant (Eds.), *Sleep and epilepsy* (pp. 347-359). New York: Academic Press.

Barrett, D. (1991). Flying dreams and lucidity: An empirical study of their relationship. *Dreaming, 1*, 129-134.

Bartholomew, R. E., Basterfield, K., & Howard, G. S. (1991). UFO abductees and contactees: Psychopathology or fantasy proneness? *Professional Psychology: Research and Practice, 22*, 215-222.

Bartram, D., & Bayliss, R. (1984). Automated testing: Past, present and future. *Journal of Occupational Psychology, 57*, 221-237.

Bell, C. C., Dixie Bell, D. D., & Thompson, B. (1986a). Panic attacks: Relationship to isolated sleep paralysis. *American Journal of Psychiatry, 143*, 1484.

Bell, C. C., Dixie Bell, D. D., & Thompson, B. (1986b). Further studies on the prevalence of isolated sleep paralysis in black subjects. *Journal of the National Medical Association, 78*, 649-659.

Bell, C. C., Shakoor, B., Thompson, B., Dew, D., Hughley, E., Mays, R., & Shorter-Gooden, K. (1984). Prevalence of isolated sleep paralysis in black subjects. *Journal of the American Medical Association, 76*, 501-508.

Belvedere, E., & Foulkes, D. (1971). Telepathy and dreams: A failure to replicate. *Perceptual and Motor Skills, 33*, 783-789.

Bem, D. J. (1994). Anomaly or artifact – response. *Psychological Bulletin, 115*, 25-27.

Bem, D. J., & Honorton, C. (1994). Does psi exist? Replicable evidence for an anomalous process of information transfer. *Psychological Bulletin, 115*, 4-18.

Bentler, P. (1989). *EQS structural relations program manual*. Los Angeles, CA: BMDP Statistical Software.

Bentler, P. M. (1993). *EQS structural equations program manual*. Los Angeles, CA: BMDP Statistical Software.

Bentler, P. M., & Chou, C-P. (1987). Practical issues in structural modeling. *Sociological Methods and Research, 16*, 78-117.

Bentler, P. M., & Wu, E. J. C. (1993). *EQS/Windows user's guide version 4.* Los Angeles, CA: BMDP Statistical Software.

Berger, R. E., & Persinger, M. A. (1991). Geophysical variables and behaviour: LXVII. Quieter annual geomagnetic activity and larger effect size for experimental psi (ESP) studies over six decades. *Perceptual and Motor Skills, 73*, 1219-1223.

Bertini, M., Lewis, H. B., & Witkin, H. A. (1969). Some preliminary observations with an experimental procedure for the study of hypnagogic and related phenomena. In C. T. Tart (Ed.), *Altered states of consciousness* (pp. 93-111). New York: John Wiley & Sons.

Besterman, T. (1923). Report of an inquiry into precognitive dreams. *Proceedings of the Society for Psychical Research, 41*, 186-204.

Bexton, W. H., Heron, W., & Scott, T. H. (1954). Effects of decreased variations in the sensory environment. *Canadian Journal of Psychology, 8*, 70-76.

Blackmore, S. (1994). Close encounters. In M. Belderson (Producer), *Horizon.* London: British Broadcasting Corporation.

Blackmore, S. (1996, September). *On the edge of reality.* Paper presented at the British Association Annual Festival of Science, Birmingham, England.

Blackmore, S. (1998). Abduction by aliens or sleep paralysis? *Skeptical Inquirer, 22*, 23-28.

Blackmore, S., & Rose, N. (1996, August/September). *Experiences on the borderline between reality and imagination.* Paper presented at the 20th International Conference of the Society for Psychical Research, The Royal Agricultural College, Cirencester, England.

Blackmore, S. J. (1982a). *Beyond the body: An investigation of out-of-the-body experiences.* London: Heinemann.

Blackmore, S. J. (1982b). Out-of-body experiences, lucid dreams, and imagery: Two surveys. *Journal of the American Society for Psychical Research, 76*, 301-317.

Blackmore, S. J. (1983). Birth and the OBE: An unhelpful analogy. *Journal of the American Society for Psychical Research, 77*, 229-238.

Blackmore, S. J. (1984). A postal survey of OBEs and other experiences. *Journal of the Society for Psychical Research, 52*, 225-244.

Blackmore, S. J. (1986). Spontaneous and deliberate OBEs: A questionnaire survey. *Journal of the Society for Psychical Research, 53*, 218-224.

Blackmore, S. J., & Rose, N. (1997). Reality and imagination: A psi-conducive confusion? *Journal of Parapsychology, 61*, 321-335.

Blackmore, S. J., & Troscianko, T. (1985). Belief in the paranormal: Probability judgements, illusory control, and the "chance baseline shift". *British Journal of Psychology, 76*, 459-468.

Bollen, K. A., & Long, J. S. (Eds.) (1993). *Testing structural equation models.* Newbury Park, CA: Sage.

Bradley, N. (1999). Sampling for internet surveys. An examination of respondent selection for internet research. *Journal of the Market Research Society, 41*, 387-395.

Braud, W. (1977). Long-distance dream and presleep telepathy. In J. D. Morris,W. G. Roll, & R. L. Morris (Eds.), *Research in Parapsychology 1976* (pp. 154-155). Metuchen, NJ: Scarecrow Press.

Braud, W. G. (1994). Can our intentions interact directly with the physical world? *European Journal of Parapsychology, 10*:78-90.

Braud, W. G., & Braud, L. W. (1975). The psi-conducive syndrome: Free response GESP performance following evocation of 'left-hemispheric' vs. 'right-hemispheric' functioning. In J. D. Morris, W. G. Roll, & R. L. Morris (Eds.), *Research in Parapsychology 1974* (pp. 17-20). Metuchen, NJ: Scarecrow Press.

Braud, W. G., & Dennis, S. P. (1989). Geophysical variables and behavior: LVIII. Autonomic activity, hemolysis, and biological psychokinesis: Possible relationships with geomagnetic field activity. *Perceptual and Motor Skills, 68*, 1243-1254.

Braud, W. G., Wood, R., & Braud, L. W. (1975). Free response GESP performance during an experimental hypnagogic state induced by visual and acoustic ganzfeld techniques: A replication and extension. *Journal of the American Society for Psychical Research, 69*, 105-114.

Braude, S. E. (1979). *ESP and psychokinesis: A philosophical examination.* Philadelphia, PA: Temple University Press.

Bray, J. J., Cragg, P. A., Macknight, A. D. C., Mills, R. G., & Taylor, D. W. (Eds.) (1992). *Lecture notes on human physiology* (2nd ed.). Oxford, England: Blackwell.

Breckler, S. J. (1990). Applications of covariance structure modeling in psychology: Cause for concern? *Psychological Bulletin, 107*, 260-273.

Brosnan, M. (1999). Computer anxiety in students: should computer-based assessment be used at all? In S. Brown, J. Bull, & P. Race (Eds.), *Computer-assisted assessment in Higher Education* (pp. 47-54). London: Kogan Page.

Brosnan, M., & Davidson, M. (1994). Computerphobia: Is it a particularly female phenomenon? *The Psychologist, 7*, 73-78.

Broughton, R. S. (1991). *Parapsychology: The controversial science.* New York, NY: Ballantine Books.

Bryant, R. A. (1995). Fantasy proneness, reported childhood abuse, and the relevance of reported abuse onset. *International Journal of Clinical and Experimental Hypnosis*, 43,184-193.

Bryman, A., & Cramer, D. (1997). *Quantitative data analysis with SPSS for Windows: A guide for social scientists.* London: Routledge.

Buchanan, T., & Smith, J. L. (1999). Using the internet for psychological research: Personality testing on the World Wide Web. *British Journal of Psychology, 90*, 125-144.

Bullard, T. E. (1994). Kenneth Ring's imaginal realm hypothesis. In A. Pritchard, D. E. Pritchard, J. E. Mack, P. Kasey, & C. Yapp (Eds.), *Alien discussions: Proceedings of the Abduction Study Conference held at MIT* (pp. 400-407). Cambridge, MA: North Cambridge Press.

Bullock, H. E., Harlow, L. L., & Mulaik, S. A. (1994). Causation issues in structural equation modeling research. *Structural Equation Modeling, 1*, 253-267.

Byrne, B. M. (1994). *Structural equation modelling with EQS and EQS/Windows: Basic concepts, applications, and programming*. Thousand Oaks, CA: Sage.

Cameron, T, & Roll, W. G. (1983). An investigation of apparitional experiences. *Theta, 11*, 74-78.

Campbell, J. (1987). *Cognition and the apparitional experience: An exploratory study*. Unpublished master's thesis. University of New England, Armidale, Australia.

Campbell, J. (1992). Cognition and the apparitional experience: An Australian study. *Australian Parapsychological Review, 17*, 8-16.

Chari, C. T. K. (1977). Some generalized theories and models of psi: A critical evaluation.In B. B. Wolman (Ed.), *Handbook of parapsychology* (pp. 803-822). New York: Van Nostrand Reinhold.

Cheyne, J. A. (1998). *Sleep paralysis page*. [Online]. Available HTTP: Hostname: watarts.uwaterloo.ca Directory: ~acheyne File: S_P.html

Cheyne, J. A., Newby-Clark, I., R., & Rueffer, S. D. (1999). Relations among hypnagogic and hypnopompic experiences associated with sleep paralysis. *Journal of Sleep Research, 8*, 313-317.

Cheyne, J. A., Rueffer, S. D., & Newby-Clark, I. R. (1999). Hypnagogic and hypnopompic hallucinations during sleep paralysis: Neurological and cultural construction of the night-mare. *Consciousness and Cognition, 8,* 319-337.

Child, I. L. (1985). Psychology and anomalous observations: The question of ESP in dreams. *American Psychologist, 40*, 1219-1230.

Child, I. L., Kanthamani, H., & Sweeney, V. M. (1977). A simplified experiment in dream telepathy. In J. D. Morris, W.G. Roll, & R. L. Morris (Eds.), *Research in Parapsychology 1976* (pp. 91-93). Metuchen, NJ: Scarecrow Press.

Chou, C-P., & Bentler, P. M. (1995). Estimates and tests in structural equation modeling. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 37-55). Thousand Oaks, CA: Sage.

Clark-Carter, D. (1997). *Doing quantitative psychological research: From design to report*. Hove, England: Psychology Press.

Clarke, D. (1991). Belief in the paranormal: A New Zealand survey. *Journal of the Society for Psychical Research, 57*, 412-425.

Clarke, D. (1995). Experience and other reasons given for belief and disbelief in paranormal and religious phenomena. *Journal of the Society for Psychical Research, 60*, 371-384.

Clayton, R. L., & Werking, G. S. (1998). Business surveys of the future: The world wide web as a data collection methodology. In M. P. Couper, R. P. Baker, J. Bethlehem, C. Z. F. Clark, J. Martin, W. L. Nicholls II, & J. M. O'Reilly (Eds.), *Computer assisted survey information* (pp. 543-562). New York: John Wiley & Son.

Clemmer, E. J. (1986). Not so anomalous observations question ESP in dreams. *American Psychologist, 41*, 1173-1174.

Conesa, J. (1995). Relationship between isolated sleep paralysis and geomagnetic influences: A case study. *Perceptual and Motor Skills, 80*, 1263-1273.

Conesa, J. (1997). Isolated sleep paralysis, vivid dreams and geomagnetic influences: II. *Perceptual and Motor Skills, 85*, 579-584.

Cook, C. M., & Persinger, M. A. (1997). Experimental induction of the "sensed presence" in normal subjects and an exceptional subject. *Perceptual and Motor Skills, 85*, 683-693.

Council, J. R., Chambers, D., Jundt, T. A., & Good, M. D. (1991). Are the mental images of fantasy-prone persons really more "real"? *Imagination, Cognition and Personality, 10*, 319-327.

Council, J. R., & Edwards, P.W. (1987). *Survey of traumatic childhood events.* Unpublished measure. Fargo: North Dakota State University.

Council, J. R., & Huff, K. D. (1990). Hypnosis, fantasy activity, and reports of paranormal experiences in high, medium and low fantasizers. *British Journal of Experimental and Clinical Hypnosis, 7*, 9-15.

Couper, M. P., & Nicholls, W. L. II. (1998). The history and development of computer assisted survey information collection methods. In M. P. Couper, R. P. Baker, J. Bethlehem, C. Z. F. Clark, J. Martin, W. L. Nicholls II, & J. M. O'Reilly (Eds.), *Computer assisted survey information* (pp. 1-21). New York: John Wiley & Son.

Cowen, D., & Levin, R. (1995). The use of the Hartmann Boundary Questionnaire with an adolescent population. *Dreaming, 5*, 105-114.

Critchley, M. (1955). The pre-dormitum. *Revue Neurologique, 93*, 101-106.

Dahlitz, M., & Parkes, J. D. (1993). Sleep paralysis. *Lancet, 341*, 406-407.

Dale, L. A., & White, R. A. (1977). Glossary of terms found in the literature of psychical research and parapsychology. In B. B. Wolman (Ed.), *Handbook of parapsychology* (pp. 921-936). New York: Van Nostrand Reinhold.

Dalton, K. (1997). Exploring the links: Creativity and psi in the ganzfeld. *Proceedings of Presented Papers: The Parapsychological Association 40th Annual Convention*, 119-134.

Dalton, K., Steinkamp, F., & Sherwood, S. J. (in press). A dream GESP experiment using dynamic targets and consensus vote. *Journal of the American Society for Psychical Research.*

Dalton, K., Utts, J., Novotny, G., Sickafoose, L., Burrone, J., & Phillips, C. (2000). Dream GESP and consensus vote: A replication. *Proceedings of Presented Papers: The Parapsychological Association 43rd Annual Convention,* 74-85.

Davis, J. W. (1979). Psi in animals: A review of laboratory research. *Parapsychology Review 10*, 1-9.

Davis, H., Davis, P. A., Loomis, L., Harvey, N., & Hobart, G. (1938). Human brain potentials during the onset of sleep. *Journal of Neurophysiology, 1*, 24-38.

Davis, G. A., Peterson, J. M., & Farley, F. H. (1974). Attitudes, motivation, sensation seeking, and belief in ESP as predictors of real creative behavior. *Journal of Creative Behavior, 8*, 31-39.

Davis, R. N. (1999). Web-based administration of a personality questionnaire: Comparison to traditional methods. *Behavior Research Methods, Instruments, and Computers, 31*, 572-577.

Dawkins, R. (1989). *The selfish gene.* Oxford: Oxford University Press.

Dement, W., & Kleitman, N. (1957). Cyclic variations in EEG during sleep and their relation to eye movements, body motility, and dreaming. *Electroencephalography and Clinical Neurophysiology, 9*, 673-690.

Dening, T. R., & Berrios, G. E. (1994). Autoscopic phenomena. *British Journal of Psychiatry, 165*, 808-817.
Ding, L., Velicer, W. F., & Harlow, L. L. (1995). Effects of estimation methods, number of indicators per factor, and improper solutions on structural equation modeling fit indices. *Structural Equation Modeling, 2*, 119-143.
Donderi, D. C. (1994). Validating the Roper Poll: A scientific approach to the abduction evidence. In A. Pritchard, D. E. Pritchard, J. E. Mack, P. Kasey, & C. Yapp (Eds.), *Alien discussions: Proceedings of the Abduction Study Conference held at MIT* (pp. 225-231). Cambridge, MA: North Cambridge Press.
Dunne, J. W. (1927/1958). *An experiment with time*. London: MacMillan.
Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*. Orlando, FL: Harcourt Brace Jovanovich.
Eckblad, M., & Chapman, L. J. (1983). Magical ideation as an indicator of schizotypy. *Journal of Consulting and Clinical Psychology, 51*, 215-225.
Emmons, C. F., & Sobal, J. (1981). Paranormal beliefs: Testing the marginality hypothesis. *Sociological Focus, 14*, 49-56.
Empson, J. (1993). *Sleep and dreaming* (2nd rev. ed.). London, England: Harvester Wheatsheaf.
Everett, H. C. (1962). Sleep paralysis in medical students. *Journal of Nervous and Mental Disease, 3*, 283-287.
Firestone, M. (1985). The "Old Hag:" Sleep paralysis in Newfoundland. *The Journal of Psychoanalytic Anthropology, 8*, 47-66.
Fisher, B., & Wilson, A. (1987). Selected sleep disturbances in school children reported by parents: prevalence, interrelationships, behavioral correlates and parental attributions. *Perceptual and Motor Skills, 64*, 1147-1157.
Foulkes, D., Belvedere, E., Masters, R. E. L., Houston, J., Krippner, S., Honorton, C., & Ullman, M. (1972). Long-distance 'sensory bombardment' in dreams: A failure to replicate. *Perceptual and Motor Skills, 35*, 731-734.
Foulkes, D., & Vogel, G. (1965). Mental activity at sleep onset. *Journal of Abnormal Psychology, 70*, 231-246.
French, C. C., & Kerman, M.K. (1996, December). *Childhood trauma, fantasy proneness, and belief in the paranormal.* Paper presented at the 1996 London Conference of the British Psychological Society, the Institute of Education, University of London, England.
Fukuda, K. (1993). One explanatory basis for the discrepancy of reported prevalences of sleep paralysis among healthy respondents. *Perceptual and Motor Skills, 77*, 803-807.
Fukuda, K., Miyasita, A., Inugami, M., & Ishihara, K. (1987). High prevalence of isolated sleep paralysis: Kanashibari phenomenon in Japan. *Sleep, 10*, 279-286.
Fukuda, K., Ogilvie, R. D., Chilcott, L., Venditelli, A-M., & Takeuchi, T. (1998). The prevalence of sleep paralysis among Canadian and Japanese college students. *Dreaming, 8*, 59-66.
Gackenbach, J. (1991). Frameworks for understanding lucid dreaming: A review. *Dreaming, 1*, 109-128.

Gallagher, C., Kumar, V. K., & Pekala, R. J. (1994). The Anomalous Experiences Inventory: Reliability and validity. *Journal of Parapsychology*, *58*, 402-428.
Gallup, G. H., & Newport, F. (1991). Belief in paranormal phenomena among adult Americans. *Skeptical Inquirer*, *15*, 137-146.
Gauld, A. (1977). Discarnate survival. In B. B. Wolman (Ed.), *Handbook of parapsychology* (pp. 577-630). New York: Von Nostrand Reinhold.
Gauld, A., & Cornell, A. D. (1979). *Poltergeists*. London: Routledge & Kegan Paul.
Gearhart, L., & Persinger, M. A. (1986). Geophysical variables and behavior: XXXIII. Onsets of historical and contemporary poltergeist episodes occurred with sudden increases in geomagnetic activity. *Perceptual and Motor Skills*, *62*, 463-466.
Gertz, J. (1983). Hypnagogic fantasy, EEG, and psi performance in a single subject. *Journal of the American Society for Psychical Research*, *77*, 155-170.
Gillespie, G. (1989). Lights and lattices and where they are seen. *Perceptual and Motor Skills*, *68*, 487-504.
Glicksohn, J. (1986). Psi and altered states of consciousness: The "missing" link. *Journal of Parapsychology*, *50*, 213-233.
Glicksohn, J. (1989). The structure of subjective experience: Interdependencies along the sleep-wakefulness continuum. *Journal of Mental Imagery*, *13*, 99-106.
Glicksohn, J. (1990). Belief in the paranormal and subjective paranormal experience. *Personality and Individual Differences*, *11*, 675-683.
Globus, G. G., Knapp, P. H., Skinner, J. C., & Healy, G. (1968). An appraisal of telepathic communication in dreams. *Psychophysiology*, *4*, 365.
Goertzel, T. (1994). Measuring the prevalence of false memories. *Skeptical Inquirer*, *18*, 266-272.
Goode, G. B. (1962). Sleep paralysis. *Archives of Neurology*, *6*, 228-234.
Goodenough, D. R. (1991). Dream recall: History and current status of the field. In S. J. Ellman, & J. S. Antrobus (Eds.), *The mind in sleep: Psychology and psychophysiology* (2nd ed.) (pp. 143-171). New York: John Wiley.
Gorsuch, R. L. (1983). *Factor analysis*. Hillsdale, NJ: Erlbaum.
Green, C., & McCreery, C. (1989). *Apparitions*. Oxford, England: Institute of Psychophysical Research.
Green, C., & McCreery, C. (1994). *Lucid dreaming: The paradox of consciousness during sleep*. London: Routledge.
Green, C. E. (1968). *Out-of-the-body experiences*. London: Hamish Hamilton.
Green, C. E., & McCreery, C. (1975). *Apparitions*. London: Hamish Hamilton.
Greyson, B. (2000). Near-death experiences. In E. Cardeña, S. J. Lynn, & S. Krippner (Eds.), *Varieties of anomalous experience: Examining the scientific evidence* (pp. 315-352). Washington, DC: APA.
Grimmer, M. R., & White, K. D. (1990). The structure of paranormal beliefs among Australian psychology students. *Journal of Psychology*, *124*, 357-370.
Gurney, E., Myers, F. W. H., & Podmore, F. (1886). *Phantasms of the Living*. London: Trubner & Co.
Guyton, A. C. (1991). *Textbook of medical physiology* (8th ed.). London: W. B. Saunders.
GVU Center (1998). *GVU's 10th WWW survey results*, [On-line]. Available HTTP: Hostname: www.gvu.gatech.edu Directory: user_surveys/survey-1998-10

Hair, J. F., Jr., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis* (5th ed.). Upper Saddle River, NJ: Prentice-Hall.
Haraldsson, E. (1975). Reported dream recall, precognitive dreams, and ESP. In J. D. Morris, W. G. Roll, & R. L. Morris (Eds.), *Research in Parapsychology 1974* (pp.47-48). Metuchen, NJ: Scarecrow Press.
Haraldsson, E. (1981). Some determinants of belief in psychical phenomena. *Journal of the American Society for Psychical Research, 75*, 297-309.
Haraldsson, E. (1985). Representative national surveys of psychic phenomena: Iceland, Great Britain, Sweden, USA and Gallup's multinational survey. *Journal of the Society for Psychical Research, 53*, 145-158.
Haraldsson, E., Gudmundsdottir, A., Ragnarsson, A., Loftsson, J., & Jonsson, S. (1977). National survey of psychical experiences and attitudes toward the paranormal in Iceland. In J. D. Morris, W. G. Roll, & R. L. Morris (Eds.), *Research in parapsychology 1976* (pp. 182-186). Metuchen, NJ: Scarecrow Prcss.
Haraldsson, E., & Houtkooper, J. M. (1991). Psychic experiences in the multinational human values study: Who reports them? *Journal of the American Society for Psychical Research, 85*, 145-165.
Harary, S. B. (1978). A personal perspective on out-of-body experiences. In D. S. Rogo (Ed.), *Mind beyond the body: The mystery of ESP projection.* Harmondsworth, England: Penguin Books.
Harley, T. A. (1989). Psi missing in a dream clairvoyance experiment. *Journal of the Society for Psychical Research, 56*, 1-7.
Harriman, P. L. (1939). The dream of falling. *Journal of General Psychology, 20*, 229-233.
Hartmann, E. (1991). *Boundaries in the mind: A new psychology of personality.* New York: Basic Books.
Hartmann, E., Rosen, R., & Rand, W. (1998). Personality and dreaming: Boundary structure and dream content. *Dreaming, 8*, 31-39.
Hastings, A., Hutton, M., Braud, W., Bennett, C., Berk, I., Boynton, T., Dawn, C., Ferguson, E., Goldman, A., Greene, E., Hewett, M., Lind, V., McLellan, K., & Steinbach-Humphrey, S. (1999). Psychomanteum research: Experiential phenomena and effects on feelings about deceased friends and relatives. *The Parapsychological Association 42nd Annual Convention Proceedings of Presented Papers*, 96-111.
Healy, J. (1986). Hippocampal kindling, theta resonance, and psi. *Journal of the Society for Psychical Research, 53*, 352-368.
Hearne, K. (1990). *The dream machine: Lucid dreams and how to control them.* Wellingborough, England: Aquarian Press.
Hearne, K. M. (1987). A dream-telepathy study using a home "dream machine." *Journal of the Society for Psychical Research, 54*, 139-142.
Hearne, K. M. (1989). A nationwide mass dream-telepathy experiment. *Journal of the Society for Psychical Research, 55*, 271-274.
Hewson, C. M., Laurent, D., & Vogel, C. M. (1996). Proper methodologies for psychological and sociological studies conducted via the Internet. *Behavior Research Methods, Instruments, & Computers, 28*, 186-191.

Hicks, R. A., Bautista, J., & Hicks, G. J. (1999). Boundaries and level of experience with six types of dreams. *Perceptual and Motor Skills, 89*, 760-762.

Hishikawa, Y. (1976). Sleep paralysis. In C. Guilleminault, P. Passouant, & W. C. Dement (Eds.), *Advances in sleep research: Vol. 3. Narcolepsy* (pp.97-124). New York: Spectrum.

Hishikawa, Y., & Shimizu, T. (1995). Physiology of REM sleep, cataplexy, and sleep paralysis. In S. Fahn, M. Hallett, H. O. Lüders, and C. D. Marsden (Eds.), *Negative motor phenomena, advances in neurology, Vol. 67* (pp. 245-271). Philadelphia: Lippincott-Raven.

Holt, R. R. (1972). On the nature and generality of mental imagery. In P. Sheehan (Ed.) (1972), *The function and nature of imagery*. New York: Academic Press.

Honorton, C. (1977). Psi and internal attention states. In B. B. Wolman (Ed.), *Handbook of parapsychology* (pp. 435-472). New York: Van Nostrand Reinhold.

Honorton, C. (1985). Meta-analysis of psi ganzfeld research: A response to Hyman. *Journal of Parapsychology, 49*, 51-91.

Honorton, C., Berger, R., Varvoglis, M., Quant, M., Derr, P., Schecter, E., & Ferrari, D. (1990). Psi communication in the ganzfeld: Experiments with an automated testing system and a comparison with a meta-analysis of earlier studies. *Journal of Parapsychology, 54*, 99- 139.

Honorton, C., & Harper, S. (1974). Psi-mediated imagery and ideation in an experimental procedure for regulating perceptual input. *Journal of the American Society for Psychical Research, 2*, 156-168.

Hopkins, B., Jacobs, D. M., & Westrum, R. (1992). *Unusual personal experiences: an analysis of the data from three national surveys conducted by the Roper Organization*. Las Vegas, NV: Bigelow Holding Corporation.

Hori, T., Hayashi, M., & Morikawa, T. (1994). Topographical EEG changes and the hypnagogic experience. In R. D. Ogilvie, & J. R. Harsh (Eds.), *Sleep onset: Normal and abnormal processes* (pp. 237-253). Washington, DC: American Psychological Association.

Horne, J. (1992). Sleep and its disorders in children. *Journal of Child Psychology and Psychiatry, 33*, 473-487.

Howell, D. C. (1987). *Statistical methods for psychology* (2nd ed.). Boston, MA: Duxbury Press.

Hoyle, R. H. (1995). The structural equations modeling approach: Basic concepts and fundamental issues. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 1-15). Thousand Oaks, CA: Sage.

Hoyle, R. H., & Panter, A. T. (1995). Writing about structural equation models. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 158-176). Thousand Oaks, CA: Sage.

Hu, L-T., & Bentler, P. M. (1995). Evaluating model fit. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 76-99). Thousand Oaks, CA: Sage.

Hu, L., Bentler, P. M., & Kano, Y. (1992). Can test statistics in covariance structure analysis be trusted? *Psychological Bulletin, 112*, 351-362.

Hufford, D. J. (1982). *The terror that comes in the night: An experience-centered study of supernatural assault traditions.* Philadelphia, PA: University of Pennsylvania Press.

Hufford, D. J. (1994). Awakening paralyzed in the presence of a strange "visitor." In A. Pritchard, D. E. Pritchard, J. E. Mack, P. Kasey, & C. Yapp (Eds.), *Alien discussions: Proceedings of the Abduction Study Conference held at MIT* (pp. 348-354). Cambridge, MA: North Cambridge Press.

Hunt, H. T., Gervais, A., Shearing Johns, S., & Travis, F. (1992). Transpersonal experiences in childhood: An exploratory empirical study of selected adult groups. *Perceptual and Motor Skills, 75*, 1135-1153.

Hyman, R. (1985). The ganzfeld psi experiment: A critical appraisal. *Journal of Parapsychology, 49*, 3-49.

Hyman, R. (1994). Anomaly or artifact – comments. *Psychological Bulletin, 115*, 19-24.

Hyman, R., & Honorton, C. (1986). A joint communiqué: The psi ganzfeld controversy. *Journal of Parapsychology, 50*, 351-364.

Iping Petterson, J. A., & Roll, W. G. (1994). Psychic experiences are psychological, not parapsychological. *Journal of Parapsychology, 58*, 79-80.

Irwin, H. J. (1985a). A study of the measurement and the correlates of paranormal belief. *Journal of the American Society for Psychical Research, 79*, 301-326.

Irwin, H. J. (1985b). *Flight of mind: A psychological study of the out-of-body experience*. Metuchen, NJ: Scarecrow Press.

Irwin, H. J. (1986a). Perceptual perspective of visual imagery in OBEs, dreams and reminiscence. *Journal of the Society for Psychical Research, 53*, 210-217.

Irwin, H. J. (1986b). The relationship between locus of control and belief in the paranormal. *Parapsychological Journal of South Africa, 7*, 1-23.

Irwin, H. J. (1990). Fantasy proneness and paranormal beliefs. *Psychological Reports, 66*, 655-658.

Irwin, H. J. (1991a). A study of paranormal belief, psychological adjustment, and fantasy proneness. *Journal of the American Society for Psychical Research, 85*, 317-331.

Irwin, H. J. (1991b). The reasoning skills of paranormal believers. *Journal of Parapsychology, 55*, 281-300.

Irwin, H. J. (1992). Origins and functions of paranormal belief: The role of childhood trauma and interpersonal control. *Journal of the American Society for Psychical Research, 86*, 199-208.

Irwin, H. J. (1993a). Belief in the paranormal: A review of the empirical literature. *Journal of the American Society for Psychical Research, 87*, 1-39.

Irwin, H. J. (1993b). The near-death experience as a dissociative phenomenon: An empirical assessment. *Journal of Near-Death Studies, 87*, 95-103.

Irwin, H. J. (1994a). *An introduction to parapsychology* (2nd ed.). Jefferson, NC: McFarland.

Irwin, H. J. (1994b). Proneness to dissociation and traumatic childhood events. *Journal of Nervous and Mental Disease, 182*, 456-460.

Irwin, H. J. (1994c). The phenomenology of parapsychological experiences. In S. Krippner (Ed.), *Advances in parapsychological research volume 7* (pp. 10-76). Jefferson, NC: McFarland.

Irwin, H. J. (1996). Childhood antecedents of out-of-body and déjà vu experiences. *Journal of the American Society for Psychical Research, 90*, 157-173.
Irwin, H. J. (1997). An empirically derived typology of paranormal believers. *European Journal of Parapsychology, 13*, 1-14.
Irwin, H. J. (1999). *An introduction to parapsychology* (3rd ed.). Jefferson, NC: McFarland.
Isakower, O. A. (1938). A contribution to the pathopsychology of phenomena associated with falling asleep. *International Journal of Psychoanalysis, 19*, 331-345.
Kanthamani, H., & Broughton, R. S. (1992). An experiment in ganzfeld and dreams: A further confirmation. *Proceedings of the 35th Annual Convention of the Parapsychological Association*, 59-73.
Kanthamani, H., & Khilji, A. (1990). An experiment in ganzfeld and dreams: A confirmatory study. *Proceedings of the 33th Annual Convention of the Parapsychological Association*, 126-137.
Kanthamani, H., Khilji, A., & Rustomji-Kerns, R. (1989). An experiment in ganzfeld and dreams with a clairvoyance technique. In L. A. Henkel, & R. E. Berger (Eds.), *Research in Parapsychology 1988* (pp. 84-88). Metuchen, NJ: Scarecrow Press.
Kavey N. B., & Whyte, J. (1993). Somnambulism associated with hallucinations. *Psychosomatics, 34*, 86-90.
Kelly, E. F., & Locke, R. G. (1981). A note on scrying. *Journal of the American Society for Psychical Research, 75*, 220-227.
Kennedy, J. (1994). Exploring the limits of science and beyond. *Journal of Parapsychology, 58*, 59-77.
Kennedy, J. E., Kanthamani, H., & Palmer, J. (1994). Psychic and spiritual experiences, health, well-being, and meaning in life. *Journal of Parapsychology, 58*, 353-383.
Kettlewell, N., Lipscomb, S., & Evans, E. (1993). Differences in neuropsychological correlates between normals and those experiencing "Old Hag Attacks". *Perceptual and Motor Skills, 76*, 839-846.
Kihlstrom, J. F., Glisky, M. L., & Angiulo, M. J. (1994). Dissociative tendencies and dissociative disorders. *Journal of Abnormal Psychology, 103*, 117-124.
King, W. C., & Miles, E. W. (1995). A quasi-experimental assessment of the effect of computerizing noncognitive paper-and-pencil measurements: A test of measurement equivalence. *Journal of Applied Psychology, 80*, 643-651.
Klass, P. J (1993). 3.7 million Americans kidnapped by aliens? Part 2: Additional comments about the 'Unusual Personal Experiences' survey. *Skeptical Inquirer, 17*, 145-146.
Kline, P. (1993). *The handbook of psychological testing.* London: Routledge.
Kline, P. (1994). *An easy guide to factor analysis.* London: Routledge.
Klüver, H. (1942). Mechanisms of hallucinations. In Q. McNemar & M. A. Merrill (Eds.), *Studies in personality: Contributed in honor of Lewis M. Terman.* New York: McGraw-Hill.
Kohr, R. L. (1980). A survey of psi experiences among members of a special population. *Journal of the American Society for Psychical Research, 74*, 395-411.

Kottmeyer, M. (1988). Abduction: The boundary deficit hypothesis. *Magonia, 37*, 3-7.
Krippner, S. (1991). An experimental approach to the anomalous dream. In J. Gackenbach & A. A. Sheikh (Eds.), *Dream images: A call to mental arms* (pp. 31-54). Amityville, NY: Baywood Publishing Company.
Krippner, S. (1996). A pilot study in ESP, dreams and purported OBEs. *Journal of the Society for Psychical Research, 61*, 88-93.
Krippner, S., & Achterberg, J. (2000). Anomalous healing experiences. In E. Cardeña, S. J. Lynn, & S. Krippner (Eds.), *Varieties of anomalous experience: Examining the scientific evidence* (pp. 353-395). Washington, DC: APA.
Krippner, S., Vaughan, A., & Spottiswoode, J. (2000). Geomagnetic factors in subjective precognitive dream experiences. *Journal of the Society for Psychical Research, 64*, 109-118.
Kumar, V. K., Pekala, R. J., & Cummings, J. (1993). Sensation seeking, drug use and reported paranormal beliefs and experiences. *Personality and Individual Differences, 14*, 685-691.
Kunzendorf, R. G., Hartmann, E., Cohen, R., & Cutler, J. (1997). Bizarreness of the dreams and daydreams reported by individuals with thin and thick boundaries. *Dreaming, 7*, 265-271.
LaBerge, S. (1990). Lucid dreaming: Psychophysiological studies of consciousness during REM sleep. In R. R. Bootzin, J. F. Kihlstrom, & D. L. Schacter (Eds.), *Sleep and cognition* (pp. 109-126). Washington, DC: American Psychological Association.
LaBerge, S., & Gackenbach, J. (2000). Lucid dreaming. In E. Cardeña, S. J. Lynn, & S. Krippner (Eds.), *Varieties of anomalous experience: Examining the scientific evidence* (pp. 151-182). Washington, DC: APA.
LaBerge, S., Nagel, L., Dement, W. C., & Zarcone, V., Jr. (1981). Psychophysiological correlates of the initiation of lucid dreaming. *Sleep Research, 10*, 149.
Lautenschlager G. J., & Flaherty, V. L. (1990). Computer administration of questions: More desirable or more social desirability? *Journal of Applied Psychology, 75*, 310-314.
Lavie, P. (1996). *The enchanted world of sleep.* New Haven, VA: Yale University Press.
Lawrence, A. R. (1998). *Modelling the causes and consequences of paranormal belief and experience.* Unpublished doctoral dissertation, University of Edinburgh, Scotland.
Lawrence, T., Edwards, C., Barraclough, N., Church, S., & Hetherington, F. (1995). Modelling childhood causes of paranormal belief and experience: Childhood trauma and childhood fantasy. *Personality and Individual Differences, 19*, 209-215.
Lawrence, T. R. (1993). Gathering in the sheep and goats. A meta-analysis of forced choice sheep-goat ESP studies, 1947-1993. *Proceedings of Presented Papers: The 36th Annual Convention of the Parapsychological Association*, 75-86.
Lawrence, T. R. (1995a). How many factors of paranormal belief are there? A critique of the Paranormal Belief Scale. *Journal of Parapsychology, 59*, 3-25.

Lawrence, T. R. (1995b). Moving on from the Paranormal Belief Scale: A final reply to Tobacyk. *Journal of Parapsychology, 59*, 131-140.
Lawrence, T. R., & De Cicco, P. (1997). The factor structure of the Paranormal Belief Scale: More evidence in support of the oblique five. *Journal of Parapsychology, 61*, 243-251.
Lawrence, T. R., Roe, C. A., & Williams, C. (1997). Confirming the factor structure of the paranormal beliefs scale: Big orthogonal seven or oblique five? *Journal of Parapsychology, 61*, 13-31.
Lawrence, T. R., Roe, C. A., & Williams, C. (1998). On obliquity and the PBS: Thoughts on Tobacyk and Thomas (1997). *Journal of Parapsychology, 62*, 147-151.
Leaning, F. E. (1925). An introductory study of hypnagogic phenomena. *Proceedings of the Society for Psychical Research, XXXV*, 287-411.
Lester, D. (1993). Paranormal beliefs and psychoticism. *Personality and Individual Differences, 14*, 739.
Liddon, S. C. (1967). Sleep paralysis and hypnagogic hallucinations: Their relationship to the nightmare. *Archives of General Psychiatry, 17*, 88-96.
Lynn, S. J., & Neufeld, V. A. (1996). Fantasy styles, hypnotic dreaming and fantasy proneness. *Contemporary Hypnosis, 13*, 4-12.
Lynn, S. J., & Rhue, J. W. (1987). Hypnosis, imagination, and fantasy. *Journal of Mental Imagery, 11*, 101-112.
Lynn, S. J., & Rhue, J. W. (1988). Fantasy proneness: Hypnosis, developmental antecedents, and psychopathology. *American Psychologist, 43*, 35-44.
MacCallum, R. (1986). Specification searches in covariance structure modeling. *Psychological Bulletin, 100*, 107-120.
MacCallum, R. C. (1995). Model specification: Procedures, strategies, and related issues. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 16-36). Thousand Oaks, CA: Sage.
MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modeling in psychological research. *Annual Review of Psychology, 51*, 201-226.
MacKenzie, A. (1982). *Hauntings and apparitions*. London: Heinemann.
Mack, J. E. (1994). *Abduction: Human encounters with aliens*. London: Simon & Schuster.
Mahowald, M. W., & Ettinger, M. G. (1990). Things that go bump in the night: The parasomnias revisited. *Journal of Clinical Neurophysiology, 7*, 119-143.
Mahowald, M. W., & Schenck, C. H. (1991). Status dissociatus—A perspective on states of being. *Sleep, 14*, 69-79.
Mahowald, M. W., & Thorpy, M. J. (1995). Nonarousal parasomnias in the child. In R. Ferber, & M. Kyger (Eds.), *Principles and practice of sleep medicine in the child* (pp. 115-123). London: W. B. Saunders.
Makarec, K., & Persinger, M. A. (1987). Electroencephalographic correlates of temporal lobe signs and imaginings. *Perceptual and Motor Skills, 64*, 1124-1126.

Markwick, B., & Beloff, J. (1988). Dream states and ESP: A distance experiment featuring a pure clairvoyance, free-response design. In D. H. Weiner & R. L. Morris (Eds.), *Research in parapsychology 1987* (pp. 77-81). Metuchen, NJ: Scarecrow Press.

Martinetti, R. F. (1985). Cognitive antecedents of dream recall. *Perceptual and Motor Skills, 60*, 395-401.

Martinetti, R. F. (1989). Sex differences in dream recall and components of imaginal life. *Perceptual and Motor Skills, 69*, 643-649.

Martinovic, Z. (1993). Stress and sleeping disorders. *Psihijatrija Danas,* 25, 55-64.

Maruyama, G. M. (1998). *Basics of structural equation modeling*. Thousand Oaks, CA: Sage.

Maury, M. A. (1848). Des hallucinations hypnagogiques, ou des erreurs des sens dans l'état intermédiaire entre la veille et le sommeil. *Annales Médico-Psychologique du Systéme Nerveux, 11*, 26-40.

Mavromatis, A. (1983). *Hypnagogia: The nature and function of the hypnagogic state*. Unpublished doctoral thesis. Brunel University, England.

Mavromatis, A. (1987). *Hypnagogia: The unique state of consciousness between wakefulness and sleep*. London: Routledge & Kegan Paul.

Mavromatis, A., & Richardson, J. T. E. (1984). Hypnagogic imagery. *International Review of Mental Imagery, 1*, 159-189.

McClenon, J. (1991). Social science and anomalous experience: Paradigms for investigating sporadic social phenomena. *Journal of the American Society for Psychical Research, 85*, 25-41.

McClenon, J. (1994a). Surveys of anomalous experience: A cross-cultural analysis. *Journal of the American Society for Psychical Research, 88*, 117-135.

McClenon, J. (1994b). *Wondrous events: Foundations of religious belief*. Philadelphia, PA: University of Pennsylvania Press.

McCreery, C. (1993). *Schizotypy and out-of-the-body experiences*. Unpublished doctoral thesis. University of Oxford, England.

McCreery, C., & Claridge, G. (1996a). A study of hallucination in normal subjects—I. Self-report data. *Personality and Individual Differences, 21*, 739-747.

McCreery, C., & Claridge, G. (1996b). A study of hallucination in normal subjects—II. Electrophysiological data. *Personality and Individual Differences, 21*, 749-758.

McDonough, B. E., Don, N. S., & Warren, C. A. (1994). EEG in a ganzfeld psi task. *Proceedings of the 37th Annual Convention of the Parapsychological Association*, 273-283.

McGarry, J. J., & Newberry, B. H. (1981). Beliefs in paranormal phenomena and locus of control: A field study. *Journal of Personality and Social Psychology, 41*, 725-736.

McKellar, P. (1957). *Imagination and thinking: A psychological analysis*. London: Cohen & West.

McKellar, P. (1989). *Abnormal psychology: Its experience and behaviour*. London: Routledge.

McKellar, P., & Simpson, L. (1954). Between wakefulness and sleep: Hypnagogic imagery. *British Journal of Psychology, 45*, 266-276.

Messer, W. S., & Griggs, R. A. (1989). Student belief and involvement in the paranormal and performance in introductory psychology. *Teaching of Psychology, 16*, 187-191.
Mills, A. (1994). Nightmares in Western children: An alternative interpretation suggested by data in three cases. *Journal of the American Society for Psychical Research, 88*, 309-325.
Mills, A., & Lynn, S. J. (2000). Past-life experiences. In E. Cardeña, S. J. Lynn, & S. Krippner (Eds.), *Varieties of anomalous experience: Examining the scientific evidence* (pp. 283-313). Washington, DC: APA.
Milton, J. (1992). Effects of "paranormal" experiences on people's lives: An unusual survey of spontaneous cases. *Journal of the Society for Psychical Research, 58*, 314-323.
Milton, J. (1999). Should ganzfeld research continue to be crucial in the search for a replicable psi effect? Part I. Discussion paper and introduction to an electronic mail discussion. *Journal of Parapsychology, 63*, 309-333.
Milton, J. & Wiseman, R. (1999). Does psi exist? Lack of replication of an anomalous process of information transfer. *Psychological Bulletin, 125*, 387-391.
Mindell, J. A. (1993). Sleep disorders in children. *Health Psychology, 12*, 151-162.
Mitchell, J. (1978). Out-of-body vision. In D. S. Rogo (Ed.), *Mind beyond the body: The mystery of ESP projection* (pp. 154-161). Harmondsworth, England: Penguin.
Mitchell, S. W. (1890). Some disorders of sleep. *International Journal of the Medical Sciences, 100*, 109-127.
Moody, R. A. (1992). Family reunions: Visionary encounters with the departed in a modern-day psychomanteum. *Journal of Near Death Studies, 11*, 83-121.
Moody, R. A. (1994). A latter-day psychomanteum. *The Parapsychological Association 37th Annual Convention Proceedings of Presented Papers*, 335-336.
Moody, R. with Perry, P. (1993). *Reunions: Visionary encounters with departed loved ones.* London: Little, Brown and Company.
Moorcroft, W. H. (1993). *Sleep, dreaming and sleep disorders: An introduction* (2nd ed.). Lanham, MD: University Press of America.
Morris, R. L. (1977). Parapsychology, biology and anpsi. In B. B. Wolman (Ed.), *Handbook of parapsychology* (pp. 687-716). New York: Van Nostrand Reinhold.
Morris, R. L., Harary, S. B., Janis, J., Hartwell, J., & Roll, W. G. (1978). Studies of communication during out-of-body experiences. *Journal of the American Society for Psychical Research, 72*, 1-21.
Muldoon, S. J., & Carrington, H. (1929/1974). *Projection of the astral body.* New York: Samuel Weiser.
Murphy, G. (1966). Research in creativeness: What can it tell us about extrasensory perception? *Journal of the American Society for Psychical Research, 60*, 8-22.
Murphy, K., & Lester, D. (1976). A search for correlates of belief in ESP. *Psychological Reports, 38*, 82.
Murray, J. A. (1991). Psychophysiological aspects of nightmares, night terrors, and sleepwalking. *Journal of General Psychology, 118*, 113-127.

Myers, F. W. H. (1904). *Human personality and its survival of bodily death.* London: Longmans, Green & Co.

Myers, S. A. (1983). The Wilson-Barber inventory of childhood memories and imaginings: Children's form and norms for 1337 children and adolescents. *Journal of Mental Imagery, 7*, 83-94.

Myers, S. A., & Austrin, H. R. (1985). Distal eidetic technology: Further characteristics of the fantasy-prone personality. *Journal of Mental Imagery, 9*, 57-66.

Myers, S. A., Austrin, H. R., Grisso, J. T., & Nickeson, R. C. (1983). Personality characteristics as related to the out-of-body experience. *Journal of Parapsychology, 47*, 131-144.

Nadon, R., Laurence, J., & Perry, C. (1987). Multiple predictors of hypnotic susceptibility. *Journal of Personality and Social Psychology, 53*, 948-960.

Neill, S., Pullig, C., Ross, B., & Black, W. C. (1999). *Multivariate data analysis (5th ed.): Instructor's manual.* Upper Saddle River, NJ: Prentice-Hall.

Neppe, V. M. (1983a). Temporal lobe symptomatology in subjective paranormal experients. *Journal of the American Society for Psychical Research, 77*, 1-29.

Neppe, V. M. (1983b). *The psychology of déjà vu: Have I been here before?* Johannesburg: Witwatersrand University Press.

Neppe, V. M. (1984). The temporal lobe and anomalous experience. *Parapsychological Journal of South Africa, 5*, 36-47.

Neppe, V. M. (1990). Anomalistic experience and the cerebral cortex. In S. Krippner (Ed.), *Advances in parapsychological research Vol. 6* (pp. 168-183). Jefferson, NC: McFarland.

Nesbary, D. K. (2000). *Survey research and the world wide web.* Boston: Allyn and Bacon.

Ness, R. C. (1978). The Old Hag phenomenon as sleep paralysis: A biocultural interpretation. *Culture, Medicine and Psychiatry, 2*, 15-39.

Nielsen, T. A. (1992). A self-observational study of spontaneous hypnagogic imagery using the upright napping procedure. *Imagination, Cognition and Personality, 11*, 353-366.

Noyes, R. (1998, April). [Letter]. *The Paranormal Review*, 17-19.

Ogilvie, R., Hunt, H., Sawicki, C., & McGowan, K. (1978). Searching for lucid dreams. *Sleep Research, 7*, 165.

Ohaeri, J. U., Adelekan, M. F., Odejide, A. O., & Ikuesan, B. A. (1992). The pattern of isolated sleep paralysis among Nigerian nursing students. *Journal of the National Medical Association, 84*, 67-70.

Ohaeri, J. U., Odejide, A. O., Ikuesan, B. A., & Adeyemi, J. D. (1989). The pattern of isolated sleep paralysis among Nigerian medical students. *Journal of the National Medical Association, 81*, 805-808.

Ohayon, M. M., Priest, R. G., Caulet, M., & Guilleminault, C. (1996). Hypnagogic and hypnopompic hallucinations: Pathological phenomena? *British Journal of Psychiatry, 169*, 459-467.

Ohayon, M. M., Zulley, J., Guilleminault, C., & Smirne, S. (1999). Prevalence and pathologic associations of sleep paralysis in the general population. *Neurology, 52*, 1194-1200.

Olson, J. M., & Zanna, M. P. (1993). Attitudes and attitude change. *Annual Review of Psychology*, *44*, 117-154.

Olson, M. (1988). The incidence of out-of-body experiences in hospitalized patients. *Journal of Near Death Studies*, *6*, 169-174.

Oppenheim, A. N. (1992). *Questionnaire design, interviewing and attitude measurement*. London: Pinter.

Osis, K. (1986). Characteristics of purposeful action in an apparition case. *Journal of the American Society for Psychical Research*, *80*, 175-193.

Osis, K., & Mitchell, J. L. (1977). Physiological correlates of reported out-of-body experiences. *Journal of the Society for Psychical Research*, *49*, 525-536.

Oskamp, S. (1977). *Attitudes and opinions*. Englewood Cliffs, NJ: Prentice-Hall.

Oswald, I. (1959). Sudden bodily jerks on falling asleep. *Brain*, *82*, 92-103.

Oswald, I. (1962). *Sleeping and waking*. Amsterdam: Elsevier.

Oswald, I. (1970). *Sleep*. Middlesex, England: Penguin Books.

Oswald, I. (1988). Exploding head. *Lancet*, *2*, 625.

Otis, L. P., & Alcock, J. E. (1982). Factors affecting extraordinary belief. *Journal of Social Psychology*, *118*, 77-85.

Palmer, J. (1971). Scoring in ESP tests as a function of belief in ESP. Part I. The sheep-goat effect. *Journal of the American Society for Psychical Research*, *65*, 373-408.

Palmer, J. (1978a). ESP and out-of-body experiences: An experimental approach. In D. S. Rogo (Ed.), *Mind beyond the body: The mystery of ESP projection* (pp. 193-217). Harmondsworth, England: Penguin Books.

Palmer, J. (1978b). The out-of-body experience: A psychological theory. *Parapsychology Review*, *9*, 19-22.

Palmer, J. (1979). A community mail survey of psychic experiences. *Journal of the American Society for Psychical Research*, *73*, 221-251.

Palmer, J., Bogart, D. N., Jones, S. M., & Tart, C. T. (1977). Scoring patterns in an ESP Ganzfeld experiment. *Journal of the American Society for Psychical Research*, *71*, 121-145.

Palmer, J., & Rush, J. H. (1986). Experimental methods in PK research. In Edge, H. L., Morris, R. L., Palmer, J., & Rush, J. H., *Foundations of parapsychology: Exploring the boundaries of human capability* (pp. 184-222). London: Routledge & Kegan Paul.

Parco Zuliani, N. (1986). The progression of hypnagogic images. *Indian Psychological Review*, *30*, 53-55.

Parker, A. (1975). *States of mind: ESP and altered states of consciousness*. New York: Taplinger.

Parkes, J. D. (1985). *Sleep and its disorders*. London: W. B. Saunders.

Parkes, J. D. (1986). The parasomnias. *Lancet*, November 1, 1021-1025.

Partinen, M. (1994). Sleep disorders and stress. *Journal of Psychosomatic Research*, *38*, 88-91.

Pasveer, K. A., & Ellard, J. H. (1998). The making of a personality inventory: Help from the WWW. *Behavior Research Methods, Instruments, & Computers*, *30*, 309-313.

Pearce, J. M. S. (1989). Clinical features of the exploding head syndrome. *Journal of Neurology, Neurosurgery, and Psychiatry*, *52*, 907-910.

Pekala, R. J., Kumar, V. K., & Cummings, J. (1992). Types of high hypnotically-susceptible individuals and reported attitudes and experiences of the paranormal and the anomalous. *Journal of the American Society for Psychical Research, 86*, 135-150.

Pekala, R. J., Kumar, V. K., & Marcano, G. (1995). Anomalous/paranormal experiences, hypnotic susceptibility, and dissociation. *Journal of the American Society for Psychical Research, 89*, 313-332.

Penfield, W. (1955). The role of the temporal cortex in certain psychical phenomena. *Journal of Mental Science, 101*, 451-465.

Penn, N. E., Kripke, D. F., & Scharff, J. (1981). Sleep-paralysis among medical students. *Journal of Psychology, 107*, 247-252.

Persinger, M. A. (1985). Geophysical variables and behavior: XXX. Intense paranormal experiences during days of quiet, global, geomagnetic activity. *Perceptual and Motor Skills, 61*, 320-322.

Persinger, M. A. (1989). Psi phenomena and temporal lobe activity: The geomagnetic factor. In L. A. Henkel & R. Berger (Eds.), *Research in parapsychology 1988* (pp. 121-156). Metuchen, NJ: Scarecrow Press.

Persinger, M. A. (1993). Geophysical variables and behavior: LXXI. Differential contribution of geomagnetic activity to paranormal experiences concerning death and crisis: An alternative to the ESP hypothesis. *Perceptual and Motor Skills, 76*, 555-562.

Persinger, M. A. (1995). Out-of-body-like experiences are more probable in people with elevated complex partial epileptic-like signs during periods of enhanced geomagnetic activity: A nonlinear effect. *Perceptual and Motor Skills, 80*, 563-569.

Persinger, M. A., & De Sano, C. F. (1986). Temporal lobe signs: Positive correlations with imaginings and hypnosis induction profiles. *Psychological Reports, 58*, 347-350.

Persinger, M. A., & Krippner, S. (1989). Dream ESP experiments and geomagnetic activity. *Journal of the American Society for Psychical Research, 83*, 101-116.

Persinger, M. A., & Makarec, K. (1987). Temporal lobe epileptic signs and correlative behaviors displayed by normal populations. *Journal of General Psychiatry, 114*, 179-195.

Persinger, M. A., & Makarec, K. (1993). Temporal lobe signs and correlative behaviors displayed by normal populations. *Journal of General Psychology, 114*, 179-195.

Persinger, M. A., & Schaut, G. B. (1988). Geomagnetic factors in subjective telepathic, precognitive, and postmortem experiences. *Journal of the American Society for Psychical Research, 82*, 217-235.

Persinger, M. A., & Valliant, P. M. (1985). Temporal lobe signs and reports of subjective paranormal experiences in a normal population: A replication. *Perceptual and Motor Skills, 60*, 903-909.

Pettit, F. A. (1999). Exploring the use of the World Wide Web as a psychology data collection tool. *Computers in Human Behavior, 15*, 67-71.

Pitkow, J. E., & Recker, M. M. (1995). Using the web as a survey tool: Results from the second WWW user survey. *Computer Networks and ISDN Systems, 27*, 809-822.

Pivik, R. T. (1991). Tonic and phasic events in relation to sleep mentation. In S. J. Ellman, & J. S. Antrobus (Eds.), *The mind in sleep: Psychology and psychophysiology* (2nd ed.) (pp. 214-247). New York: John Wiley.

Playfair, G. L. (1985). *If this be magic*. London: Jonathan Cape.

Powers, S. M. (1991). Fantasy proneness, amnesia, and the UFO abduction phenomenon. *Dissociation Progress in the Dissociative Disorders*, 4, 46-54.

Purcell, A. (1997, April). Listen to the penguin. [Letter]. *Fortean Times, 97*, 54.

Radin, D. (1997). *The conscious universe: The scientific truth of psychic phenomena*. New York: Harper Collins.

Radin, D. I., & Rebman, J. M. (1996). Are phantasms fact or fantasy? A preliminary investigation of apparitions evoked in the laboratory. *Journal of the Society for Psychical Research, 61*, 65-87.

Rajaram, M., & Mitra, S. (1981). Correlations between convulsive seizures and geomagnetic activity. *Neuroscience Letters, 24*, 187-191.

Ramos, M., Sedivi, B. M., & Sweet, E. M. (1998). Computerized self-administered questionnaires. In M. P. Couper, R. P. Baker, J. Bethlehem, C. Z. F. Clark, J. Martin, W. L. Nicholls II, & J. M. O'Reilly (Eds.), *Computer assisted survey information* (pp. 389-408). New York: John Wiley & Son.

Rao, P. V. K. (1992). Fantasy proneness, reports of paranormal experiences and ESP test performance. *Journal of Indian Psychology, 10*, 27-34.

Rauschenberger, S. L., & Lynn, S. J. (1995). Fantasy proneness, DSM-II--R Axis 1 psychopathology, and dissociation. *Journal of Abnormal Psychology, 104*, 373-380.

Rechtschaffen, A. (1973). The psychophysiology of mental activity during sleep. In F. J. McGuigan & R. A. Schoonover (Eds.), *The psychophysiology of thinking* (pp. 153-205). New York: Academic Press.

Rechtschaffen, A. (1994). Sleep onset: Conceptual issues. In R. D. Ogilvie & J. R. Harsh (Eds.), *Sleep onset: Normal and abnormal processes* (pp. 3-18). Washington, DC: American Psychological Association.

Rechtschaffen, A., & Kales, A. (Eds.) (1968). *A manual of standardized terminology, techniques and scoring system for sleep stages of human adults*. Washington, DC: Public Information Service, US Government Printing Office.

Reed, G. (1972). *The psychology of anomalous experience*. London: Hutchinson University Library.

Reed, G. (1988). *The psychology of anomalous experience* (rev. ed.). Buffalo, NY: Prometheus Books.

Reinsel, R., Antrobus, J. S., & Wollman, M. (1992). Bizarreness in dreams and waking fantasy. In J. S. Antrobus, & M. Bertini (Eds.), *The neuropsychology of sleep and dreaming* (pp. 157-183). Hillsdale, NJ: Lawrence Erlbaum.

Reips, U-D. (1999). *The web experiment method*. [On-line]. Available HTTP: Hostname: www.psych.unizh.ch Directory: genpsy/Ulf/Lab File: WWWExpMethod.html

Rhine, L. E. (1962). Psychological processes in ESP experiences. Part I. Waking experiences. *Journal of Parapsychology, 26*, 88-111.

Rhine, L. E. (1963). Spontaneous physical effects and the psi process. *Journal of Parapsychology*, *27*, 84-122.
Rhine, L. E. (1977). Research methods with spontaneous cases. In B. B. Wolman (Ed.), *Handbook of parapsychology* (pp. 59-80). New York: Van Nostrand Reinhold.
Rhine, L. E. (1981). *The invisible picture: A study of psychic experiences.* Jefferson, NC: McFarland & Co.
Rhue, J. W., & Lynn, S. J. (1989). Fantasy proneness, hypnotizability, and absorption—A re-examination: A brief communication. *The International Journal of Clinical and Experimental Hypnosis*, *37*, 100-106.
Rhue, J. W., & Lynn, S. J. (1991). Fantasy proneness, hypnotizability, and multiple personality disorder. In J. F. Schumaker (Ed.), *Human suggestibility: Advances in theory, research, and application* (pp. 200-218). New York, NY: Routledge.
Rhue, J. W., Lynn, S. J., Henry, S., & Buhk, K. (1991). Child abuse, imagination and hypnotizability. *Imagination, Cognition and Personality*, 10, 53-63.
Rhue, J. W., Lynn, S. J., & Sandberg, D. (1995). Dissociation, fantasy and imagination in childhood: A comparison of physically abused, sexually abused, and non-abused children. *Contemporary Hypnosis*, *12*, 131-136.
Richards, D. G. (1990). Hypnotic susceptibility and subjective psychic experiences: A study of participants in A.R.E. conferences. *Journal of Parapsychology*, *54*, 35-51.
Richards, D. G. (1996). Boundaries in the mind and subjective interpersonal psi. *Journal of Parapsychology*, *60*, 227-240.
Richardson, A. (1983). Imagery: Definition and types. In Sheikh, A. (Ed.), *Imagery: Current theory, research, and application*. New York: Wiley.
Richardson, J. T. E. (Ed.) (1996). *Handbook of qualitative research methods for psychology and the social sciences*. Leicester: BPS Books.
Richardson, J. T. E., Mavromatis, A., Mindel, T., & Owens, A. C. (1981). Individual differences in hypnagogic and hypnopompic imagery. *Journal of Mental Imagery*, *5*, 91-96.
Ring, K. (1980). *Life at death: A scientific investigation of the near-death experience*. New York: Coward, McGann & Geoghegan.
Ring, K. (1984). *Heading toward omega: In search of the meaning of the near-death experience*. New York: Morrow.
Ring, K. (1992). *The Omega Project: Near-death experiences, UFO encounters, and mind at large*. New York: Morrow.
Ring, K., & Rosing, C. J. (1990). The Omega Project: A psychological survey of persons reporting abductions and other UFO encounters. *Journal of UFO Studies*, *2*, 59-98.
Rodeghier, M. (1994). Psychosocial characteristics of abductees. In A. Pritchard, D. E. Pritchard, J. E. Mack, P. Kasey, & C. Yapp (Eds.), *Alien discussions: Proceedings of the Abduction Study Conference held at MIT* (pp. 296-303). Cambridge, MA: North Cambridge Press.
Rodeghier, M., Goodpaster, J., & Blatterbauer, S. (1991). Psychosocial characteristics of abductees: Results from the CUFOS abduction project. *Journal of UFO Studies*, *3*, 59-90.

Roe, C. A. (1998). Belief in the paranormal and attendance at psychic readings. *Journal of the American Society for Psychical Research, 92*, 25-51.
Roe, C. A. (1999). Critical thinking and belief in the paranormal: A re-evaluation. *British Journal of Psychology, 90*, 85-98.
Roll, W. G. (1977). Poltergeists. In B. B. Wolman (Ed.), *Handbook of parapsychology* (pp. 382-413). New York: Van Nostrand Reinhold.
Roll, W. G. (1982). Mediums and RSPK agents as fantasy-prone individuals. In W. G. Roll, R. L. Morris, & R. A. White (Eds), *Research in Parapsychology 1981* (pp. 42-44). Metuchen, NJ: Scarecrow Press.
Roll, W. G., & Braun, B. A. (1995). Psychomanteum research: A pilot study. *The Parapsychological Association 38th Annual Convention Proceedings of Presented Papers*, 438-443.
Roper Starch Worldwide (1998, June). *Unusual events study*. Harrison, NY: Author.
Rose, N., & Blackmore, S. (1996, August/September). *Two pilot surveys of unusual personal experiences*. Paper presented at the 20th International Conference of the Society for Psychical Research, The Royal Agricultural College, Cirencester, England.
Rose, N., Hogan, J. & Blackmore, S. (1997). Experiences of sleep paralysis. *Proceedings of the Parapsychological Association 40th Annual Convention held in conjunction with The Society for Psychical Research*, 358-369.
Rosen, G., Mahowald, M. W., & Ferber, R. (1995). Sleepwalking, confusional arousals, and sleep terrors in the child. In R. Ferber, & M. Kyger (Eds.), *Principles and practice of sleep medicine in the child* (pp. 99-106). London: W. B. Saunders.
Ross, C. A., & Joshi, S. (1992). Paranormal experiences in the general population. *Journal of Nervous and Mental Disease, 180*, 357-361.
Rowley, J. T., Stickgold, R., & Hobson, J. A. (1998). Eyelid movements and mental activity at sleep onset. *Consciousness and Cognition, 7*, 67-84.
Rush, J. H. (1986a). What is parapsychology? In Edge, H. L., Morris, R. L., Palmer, J., & Rush, J. H., *Foundations of parapsychology: Exploring the boundaries of human capability* (pp. 3-8). London: Routledge & Kegan Paul.
Rush, J. H. (1986b). Spontaneous psi phenomena: case studies and field investigations. In Edge, H. L., Morris, R. L., Palmer, J., & Rush, J. H., *Foundations of parapsychology: Exploring the boundaries of human capability* (pp. 47-69). London: Routledge & Kegan Paul.
Sachs, C., & Svanborg, E. (1991). The exploding head syndrome: Polysomnographic recordings and therapeutic suggestions. *Sleep, 14*, 263-266.
Salley, R. D. (1982). REM sleep phenomena during out-of-body experiences. *Journal of the American Society for Psychical Research, 76*, 157-165.
Sannwald, G. (1963). On the psychology of spontaneous paranormal phenomena. *International Journal of Parapsychology, 5*, 274-292.
Sargent, C. L. & Harley, T. A. (1982). Precognition testing with free-response techniques in the ganzfeld and the dream state. *European Journal of Parapsychology, 4*, 243-256.
Saucer, P. R., Cahoon, D. D., & Edmonds, E. M. (1992). The Paranormal Belief Scale and the Atheistic Ideation Reference Scale as predictors of hypnotic suggestibility. *Psychology A Journal of Human Behavior, 29*, 44-46.

Schacter, D. L. (1976). The hypnagogic state: A critical review of the literature. *Psychological Bulletin, 83*, 452-481.
Schacter, D. L., & Kelly, E. F. (1975). ESP in the twilight zone. *Journal of Parapsychology, 39*, 27-28.
Schaut, G. B., & Persinger, M. A. (1985). Geophysical variables and behavior: XXXI. Global geomagnetic activity during spontaneous paranormal experiences: A replication. *Perceptual and Motor Skills, 61*, 412-414.
Schillewaert, N., Langerak, F., & Duhamel, T. (1998). Non-probability sampling for WWW surveys: A comparison of methods. *Journal of the Market Research Society, 40*, 307-322.
Schmeidler, G. (1985). Belief and disbelief in psi. *Parapsychology Review, 16*, 1-4.
Schmeidler, G. R., & Edge, H. (1999). Should ganzfeld research continue to be crucial in the search for a replicable psi effect? Part II. Edited ganzfeld debate. *Journal of Parapsychology, 63*, 335-388.
Schmeidler, G. R., & McConnell, R. A. (1958). *ESP and personality patterns*. New Haven, CT: Yale University Press.
Schmidt, W. C (1997). World-wide web survey research: Benefits, potential problems, and solutions. *Behavior Research Methods, Instruments, & Computers, 29*, 274-279.
Schmidt, W. C., Hoffman, R., & MacDonald, J. (1997). Operate your own World-Wide Web server. *Behavior Research Methods, Instruments, & Computers, 29*, 189-193.
Schneck, J. M. (1960). Sleep paralysis without narcolepsy or cataplexy. *Journal of the American Medical Association, 173*, 1129-1130.
Schneck J. M. (1977). Hypnagogic hallucinations: Herman Melville's Moby Dick. *New York State Journal of Medicine, 77*, 2145-2147.
Schouten, S. A. (1983). Personal experience and belief in ESP. *Journal of Psychology, 114*, 219-222.
Schredl, M., Kleinferchner, P., & Gell, T. (1996). Dreaming and personality: Thick vs thin boundaries. *Dreaming, 6*, 219-223.
Schumacker, R. E., & Lomax, R. G. (1996). *A beginner's guide to structural equation modeling*. Mahwah, NJ: Lawrence Erlbaum.
Schumaker, J. F. (1987). Mental health, belief deficit compensation, and paranormal belief. *Journal of Psychology, 121*, 451-457.
Schumaker, J. F. (1990). *Wings of illusion: The origin, nature, and future of paranormal belief*. Buffalo, NY: Prometheus Books.
Sheils, D. (1978). A cross-cultural study of beliefs in out-of-the-body experiences, waking and sleeping. *Journal of the Society for Psychical Research, 49*, 697-741.
Sheldrake, R. (1994). *Seven experiments that could change the world*. London: Fourth Estate.
Sherwood, S. J. (1998). *An examination of the relationship between the hypnagogic/hypnopompic states and reports of out-of-the-body experiences*. Manuscript submitted for publication.
Sherwood, S. J. (1999). [Data from WWW survey of the features of hypnagogic and hypnopompic experiences]. Unpublished raw data.

Sherwood, S. J. (2000). A comparison of the features of the psychomanteum and hypnagogic/hypnopompic experiences. *Proceedings of the Parapsychological Association 43rd Annual Convention*, 262-275.

Sherwood, S. J., Dalton, K., Steinkamp, F., & Watt, C. (2000). Dream clairvoyance study II using dynamic video-clips: Investigation of consensus voting judging procedures and target emotionality. *Dreaming, 10*, 221-236.

Sherwood, S. J., Roe, C. A., Simmonds, C. A., & Biles, C. (1999, September). *An exploratory investigation of dream precognition using consensus judging and static targets*. Paper presented at the 23rd International Conference of the Society for Psychical Research, Durham, England.

Siegel, R. K. (1993). *Fire in the brain: Clinical tales of hallucination*. New York: Plume.

Siegel, S., & Castellan, H. J. (1988). *Nonparametric statistics for the behavioral sciences* (2nd ed.). New York: McGraw-Hill.

Siegler, R. S. (1998). *Children's thinking* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.

Siuta, J. (1990). Fantasy-proneness: Towards cross-cultural comparisons. *British Journal of Experimental and Clinical Hypnosis, 7*, 93-101.

Smith, J. A., Harré, R., & Van Langenhove (Eds.) (1995). *Rethinking methods in psychology*. London: Sage.

Smith, M. D., Foster, C. L., & Stovin, G. (1998). Intelligence and paranormal belief: Examining the role of context. *Journal of Parapsychology, 62*, 65-77.

Snyder, S. (1983). Isolated sleep paralysis after rapid time zone change ('jet lag') syndrome. *Chronobiologia, 10*, 377-379.

Snyder, T. J., & Gackenbach, J. (1988). Individual differences associated with lucid dreaming. In J. Gackenbach & S. LaBerge (Eds.), *Conscious mind, sleeping brain: Perspectives on lucid dreaming* (pp. 221-260). New York: Plenum.

Sobal, J., & Emmons, C. F. (1982). Patterns of belief in religious, psychic, and other paranormal phenomena. *Zetetic Scholar, 9*, 7-17.

Spanos, N. P., Cross, P. A., Dickson, K., & DuBreuil, S. C. (1993). Close encounters: An examination of UFO experiences. *Journal of Abnormal Psychology, 102*, 624-632.

Spanos, N. P., McNulty, S. A., DuBreuil, S. C., Pires, M., & Burgess, M. F. (1995). The frequency and correlates of sleep paralysis in a university sample. *Journal of Research in Personality, 29*, 285-305.

Sparks, G. G. (1998). Paranormal depictions in the media: How do they affect what people believe? *Skeptical Inquirer, 22*, 35-39.

Sparks, G. G., Nelson, C. L., & Campbell, R. G. (1997). The relationship between exposure to televised messages about paranormal phenomena and paranormal beliefs. *Journal of Broadcasting and Electronic Media, 41*, 345-359.

Spottiswoode, S. J. P. (1997). Geomagnetic fluctuations and free-response anomalous cognition: A new understanding. *Journal of Parapsychology, 61*, 3-12.

Stanovich, K. E. (1989). Implicit philosophies of mind: The Dualism Scale and its relation to religiosity and belief in extrasensory perception. *Journal of Psychology, 123*, 5-23.

Stanton, J. M. (1998). An empirical assessment of data collection using the internet. *Personnel Psychology*, *51*, 709-725.
Stevens, J. R. (1982). Sleep is for seizures: A new interpretation of the role of phasic ocular events in sleep and wakefulness. In M. B. Sterman, M. N. Shouse, & P. Passouant (Eds.), *Sleep and epilepsy* (pp. 249-264). New York: Academic Press.
Stevenson, I. (1977). Reincarnation: Field studies and theoretical issues. In B. B. Wolman (Ed.), *Handbook of parapsychology* (pp. 631-663). New York: Van Nostrand Reinhold.
Stevenson, I. (1982). The contribution of apparitions to the evidence for survival. *Journal of the American Society for Psychical Research*, *76*, 341-358.
Stevenson, I. (1987). *Children who remember previous lives*. Charlottesville, VA: University Press of Virginia.
Stickgold, R., & Hobson, J. A. (1994). Home monitoring of sleep onset and sleep-onset mentation using the Nightcap©. In R. D. Ogilvie, & J. R. Harsh (Eds.), *Sleep onset: Normal and abnormal processes* (pp. 141-160). Washington, DC: American Psychological Association.
Stires, L. (1993). 3.7 million Americans kidnapped by aliens? Part 1: Critiquing the 'Unusual Personal Experiences' survey. *Skeptical Inquirer*, *17*, 142-144.
Stokes, D. M. (1987). Theoretical parapsychology. In S. Krippner (Ed.), *Advances in parapsychological research Vol. 5* (pp. 77-189). Jefferson, NC: McFarland.
Stores, G. (1998). Sleep paralysis and hallucinosis. *Behavioural Neurology*, *11*, 109-112.
Strahan, R., & Gerbasi, K. C. (1972). Short, homogenous versions of the Marlowe-Crowne Social Desirability Scale. *Journal of Clinical Psychology*, *28*, 191-193.
Svenson, S. G., White, K. D., & Caird, D. (1992). Replications and resolutions: Dualistic belief, personality, religiosity, and paranormal belief in Australian students. *Journal of Psychology*, *126*, 445-447.
Symons, D. (1993). The stuff that dreams aren't made of: Why wake-state and dream-state sensory experiences differ. *Cognition*, *47*, 181-217.
Tabachnik, B. G., & Fidell, L. S. (1996). *Using multivariate statistics* (3rd ed.). New York: HarperCollins.
Takeuchi, T., Miyasita, A., Sasaki, Y., Inugami, M., & Fukuda, K. (1992). Isolated sleep paralysis elicited by sleep interruption. *Sleep*, *15*, 217-225.
Takeuchi, T., Miyasita, A., Inugami, M., Sasaki, Y, & Fukuda, K. (1994). Laboratory-documented hallucination during sleep-onset REM period in a normal subject. *Perceptual and Motor Skills*, *78*, 979-985.
Tanaka, H., Hayashi, M., & Hori, T. (1996). Statistical features of hypnagogic EEG measured by a new scoring system. *Sleep*, *19*, 731-738.
Tanaka, H., Hayashi, M., & Hori, T. (1997). Topographical characteristics and principal component structure of the hypnagogic state. *Sleep*, *20*, 523-534.
Targ, E., Schlitz, M., & Irwin, H. J. (2000). Psi-related experiences. In E. Cardeña, S. J. Lynn, & S. Krippner (Eds.), *Varieties of anomalous experience: Examining the scientific evidence* (pp. 219-252). Washington, DC: APA.
Tart, C. T. (1967). A second psychophysiological study of out-of-body experiences in a gifted subject. *International Journal of Parapsychology*, *9*, 251-258.

Tart, C. T. (1968). A psychophysiological study of out-of-body experiences in a selected subject. *Journal of the American Society for Psychical Research, 62*, 3-27.

Tart, C. T. (Ed.) (1969). *Altered states of consciousness.* New York: Wiley & Sons.

Terrillon, J., & Marques-Bonham, S. (1998). *Does recurrent isolated sleep paralysis involve more than cognitive neurosciences?* [Online]. Available HTTP: Hostname: www.hip.atr.co.jp Directory: ~terril File: SSE.Presentation.HTM

Tesser, A., & Shaffer, D. R. (1990). Attitudes and attitude change. *Annual Review of Psychology, 441*, 479-523.

Thalbourne, M. A. (1981). Extraversion and the sheep-goat variable: A conceptual replication. *Journal of the American Society for Psychical Research, 75*, 105-119.

Thalbourne, M. A. (1982). *A glossary of terms used in parapsychology*. London: Heinemann.

Thalbourne, M. A. (1984). Some correlates of belief in psychical phenomena: A partial replication of the Haraldsson findings. *Parapsychology Review, 15*, 13-15.

Thalbourne, M. A. (1985). Are believers in psi more prone to schizophrenia? In R. A. White & J. Solfvin (Eds.), *Research in Parapsychology 1984* (pp. 85-88). Metuchen, NJ: Scarecrow Press.

Thalbourne, M. A. (1994a). Belief in the paranormal and its relationship to schizophrenia-relevant measures: A confirmatory study. *British Journal of Clinical Psychology, 33*, 78-80.

Thalbourne, M. A. (1994b). The SPR Centenary Census: II. The survey of beliefs and experiences. *Journal of the Society for Psychical Research, 59*, 420-431.

Thalbourne, M. A. (1995). Further studies of the measurement and correlates of belief in the paranormal. *Journal of the American Society for Psychical Research, 89*, 233-247.

Thalbourne, M. A., Bartemucci, L., Delin, P. S., Fox, B., & Nofi, O. (1997). Transliminality: Its nature and correlates. *Journal of the American Society for Psychical Research, 91*, 305-331.

Thalbourne, M. A., & Delin, P. S. (1993). A new instrument for measuring the sheep-goat variable: Its psychometric properties and factor structure. *Journal of the Society for Psychical Research, 59*, 172-186.

Thalbourne, M. A., & Delin, P.S. (1994). A common thread underlying belief in the paranormal, creative personality, mystical experience and psychopathology. *Journal of Parapsychology, 58*, 3-38.

Thalbourne, M. A., Dunbar, K. A., & Delin, P. S. (1995). An investigation into correlates of belief in the paranormal. *Journal of the American Society for Psychical Research, 89*, 215-231.

Thalbourne, M. A., & Haraldsson, E. (1980). Personality characteristics of sheep and goats. *Personality and Individual Differences, 1*, 180-185.

Thalbourne, M. A., & Houran, J. (2000). Transliminality, the Mental Experience Inventory, and tolerance for ambiguity. *Personality and Individual Differences, 28*, 853-863.

The World Wide Web Consortium (2000). *Forms in HTML documents*. [On-line]. Available HTTP: Hostname: www.w3.org Directory: TR/REC-html40/interact File: forms.html

Thorpy, M., & Glovinsky, P. (1987). Parasomnias. *Psychiatric Clinics of North America, 10*, 623-639.

Thouless, R. H., & Wiesner, B. P. (1948). On the nature of psi phenomena. *Journal of Parapsychology, 12*, 192-212.

Tobacyk, J. (1984). Paranormal belief and college grade point average. *Psychological Reports, 54*, 217-218.

Tobacyk, J., Miller, M., & Jones, G. (1984). Paranormal beliefs of high school students. *Psychological Reports, 63*, 492-494.

Tobacyk, J. J. (1988). *A revised paranormal belief scale*. Unpublished manuscript, Louisiana Tech University at Ruston, LA.

Tobacyk, J. J. (1995a). What is the correct dimensionality of paranormal beliefs? A reply to Lawrence's critique of the Paranormal Belief Scale. *Journal of Parapsychology, 59*, 27-46.

Tobacyk, J. J. (1995b). Final thoughts on issues in the measurement of paranormal beliefs. *Journal of Parapsychology, 59*, 141-145.

Tobacyk, J. J., & Milford, G. (1983). Belief in paranormal phenomena: Assessment instrument development and implications for personality functioning. *Journal of Personality and Social Psychology, 44*, 1029-1037.

Tolaas, J. (1986). Vigilance theory and psi. Part I: Ethological and phylogenetic aspects. *Journal of the American Society for Psychical Research, 80*, 357-373.

Tonay, V. K. (1993). Personality correlates of dream recall: Who remembers? *Dreaming, 3*, 1-8.

Tseng, H-M., Tiplady, B., MacLeod, H. A., & Wright, P. (1998). Computer anxiety: A comparison of pen-based personal digital assistants, conventional computer and paper assessment of mood and performance. *British Journal of Psychology, 89*, 599-610.

Twemlow, S. W. (1977). Epilogue: Personality profile. In R. A. Monroe, *Journeys out of the body* (pp. 275-280). New York: Doubleday.

Tyrrell, G. N. M. (1943/1973). *Apparitions*. London: The Society for Psychical Research..

Ullman, J. B. (1996). Structural equation modeling. In B. G. Tabachnik, & L. S. Fidell, *Using multivariate statistics* (pp. 709-811). New York: HarperCollins.

Ullman, M. (1966). A nocturnal approach to psi. *Proceedings of the Parapsychological Association, 3*, 35-62.

Ullman, M. (1986). Vigilance theory and psi. Part II: Physiological, psychological, and parapsychological aspects. *Journal of the American Society for Psychical Research, 80*, 375-391.

Ullman, M. (1990). Dreams, species-connectedness, and the paranormal. *Journal of the American Society for Psychical Research, 84*, 105-125.

Ullman, M., & Krippner, S., with Vaughan, A. (1989). *Dream telepathy: Experiments in nocturnal ESP* (2nd ed.). Jefferson, NC: McFarland.

Van de Castle, R. L. (1971). The study of GESP in a group setting by means of dreams. *Journal of Parapsychology, 35*, 312.

Van de Castle, R. L. (1977). Sleep and dreams. In B. B. Wolman (Ed.), *Handbook of parapsychology* (pp. 473-499). Jefferson, NC: McFarland.

Van Eeden, F. (1913). A study of dreams. *Proceedings of the Society for Psychical Research, 26*, 431-461.

Wackermann, J., Pütz, P., Büchi, S., Strauch, I., & Lehmann, D. (2000). A comparison of ganzfeld and hypnagogic state in terms of electrophysiological measures and subjective experience. *Proceedings of Presented Papers: The Parapsychological Association 43rd Annual Convention*, 302-315.

Wagner, M. W., & Ratzeburg, F. H. (1987). Hypnotic suggestibility and paranormal belief. *Psychological Reports, 60*, 1069-1070.

Watt, C. (1990). The value of spontaneous cases. *Journal of the Society for Psychical Research, 56*, 273-286.

Watt, J. (1997). *Using the internet for quantitative survey research.* [On-line]. Available HTTP: Hostname: www.Quirks.com Directory: articles File: article_print.asp?arg_articleid=248

Webster, J., & Compeau, D. (1996). Computer-assisted versus paper-and-pencil administration of questionnaires. *Behavior Research Methods, Instruments, & Computers, 28*, 567-576.

Weng Wong, M. (1999). *Meng Weng Wong's home page*. [On-line]. Available HTTP: Hostname: apollo3.com Directory: general File: meng.html#perl.

West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural equation models with nonnormal variables: Problems and remedies (pp. 56-75). In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications*. Thousand Oaks, CA: Sage.

White, R. A. (1990). An experience-centered approach to parapsychology. *Exceptional Human Experience, 8*, 7-36.

White, R. A., Krippner, S., Ullman, M., & Honorton, C. (1971). Experimentally-induced telepathic dreams with EEG-REM monitoring: Some manifest content variables related to psi operation. In W. G. Roll, R. L. Morris, & J. D. Morris (Eds.), *Proceedings of the Parapsychological Association, Number 5, 1968* (pp. 85-87). Durham, NC: Parapsychological Association.

Whiteman, J. H. M. (1956). The process of separation and return in experiences fully 'out of the body.' *Proceedings of the Society for Psychical Research, 50*, 240-274.

Whiteman, J. H. M. (1978). The process of separation and return during experiences fully "Out-of-the-Body". In D. S. Rogo (Ed.), *Mind beyond the body: The mystery of ESP projection* (pp. 270-306). Harmondsworth, England: Penguin.

Wierzbicki, M. (1985). Reasoning errors and belief in the paranormal. *Journal of Social Psychology, 125*, 489-494.

Wilkinson, H. P., & Gauld, A. (1993). Geomagnetism and anomalous experiences, 1868-1980. *Proceedings of the Society for Psychical Research, 57*, 275-310.

Willging, B. T., & Lester, D. (1997). Paranormal beliefs and personality scores of high school students. *Perceptual and Motor Skills, 85*, 938.

Wilson, S. C., & Barber, T. X. (1982). The fantasy-prone personality: Implications for understanding imagery, hypnosis, and parapsychological phenomena. *PSI Research, 1*, 94-116.

Wilson, S. C., & Barber, T. X. (1983). The fantasy-prone personality: Implications for understanding imagery, hypnosis, and parapsychological phenomena. In A. A. Sheikh (Ed.), *Imagery: Current theory, research, and application* (pp. 340-387). New York: John Wiley & Son.

Windholz G., & Diamant, L. (1974). Some personality traits of believers in extraordinary phenomena. *Bulletin of the Psychonomic Society, 3*, 125-126.

Wing, Y. K., Lee, S. T., & Chen, C. N. (1994). Sleep paralysis in Chinese: Ghost oppression phenomenon in Hong Kong. *Sleep, 17*, 609-613.

Wiseman, R., Smith, M., & Milton, J. (1998). Can animals detect when their owners are returning home? An experimental test of "the psychic pet" phenomenon. *British Journal of Psychology, 89*, 453-462.

Witkin, H. A., Dyk, R. B., Faterson, H. F., Goodenough, D. R., & Karp, S. A. (1974). *Psychological differentiation.* Potomac, MD: Lawrence Erlbaum.

Wulff, D. M. (2000). Mystical experience. In E. Cardeña, S. J. Lynn, & S. Krippner (Eds.), *Varieties of anomalous experience: Examining the scientific evidence* (pp. 397-440). Washington, DC: APA.

Wuthnow, R. (1976). Astrology and marginality. *Journal for the Scientific Study of Religion, 15*, 157-168.

Zingrone, N. L., & Alvarado, C. S. (1994). Psychic and dissociative experiences: A preliminary report. *Proceedings of the 37th Annual Convention of the Parapsychological Association*, 489-501.

Zusne, L., & Jones, W. H. (1982). *Anomalistic psychology: A study of magical thinking.* Hillsdale, NJ: Lawrence Erlbaum.

Zusne, L., & Jones, W. H. (1989). *Anomalistic psychology: A study of magical thinking* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.

SURVEY OF CHILDHOOD AND ADULTHOOD SLEEPING AND WAKING EXPERIENCES

Simon Sherwood

INTRODUCTION

Your participation in this research would be greatly appreciated. This survey will form part of my PhD thesis in Psychology at the University of Edinburgh. The aims of this survey are:

- to assess the relative frequency of (and possible relationships between) childhood experiences which can occur before, during and after a period of sleep.
- to assess the relative frequency of some childhood abilities such as imagining and role-playing.
- to assess the relative frequency of (and possible relationships between) some childhood and adulthood experiences which might be considered, by some people, to be beyond current scientific understanding.

It is appreciated that the restricted population being sampled (i.e. individuals with access to the WWW) will limit the extent and the accuracy of any inferences that might be made on the basis of the data collected.

CONFIDENTIALITY

Participants should be aware that there is a small risk that a suitably skilled and motivated individual might be able to intercept information as it is being sent from your computer to our server.

However, once they have been stored on our server, your responses to this questionnaire will remain **completely confidential**. Information about individuals will **not** be divulged to any other parties nor will individuals be able to be identified in any subsequent reports.

Please note that your computer's IP address and host domain will also be recorded but in a **separate** file to that containing your responses. The reason for collecting this information is that it might give an indication of possible attempts to deliberately bias the results of this survey via repeated participation.

NOTES ON COMPLETION

Please click here if you do NOT have free WWW access

For the purposes of this survey, 'childhood' and 'adulthood' will be defined as follows:

Childhood - from the age of 2 up until the age of 18.
Adulthood - from the age of 18 upwards.

Childhood experiences may be more difficult to remember than those occurring in adulthood. Please try to give as accurate an estimate as you can. Some experiences may be relatively more common than others and therefore not everyone will have had some or all of the experiences listed. If you are uncertain whether or not you have had a particular experience (regardless of how others might interpret such an experience) then please answer 'No'.

The focus of this survey is on the experiences themselves rather than on the possible interpretations of these experiences. **There are no right or wrong answers in this survey.**

Section A

This section is concerned with a number of different childhood experiences which can occur just before, during or just after a period of sleep.

Please read through the following questions carefully and estimate the number of times that each experience has occurred during your childhood. Please do not spend too long on each question. Please use the mouse to click on the button to the right of the most appropriate response in each case.

If a particular question does not apply to you, you may be asked to move on to another question. For example "**IF you answered 'No' THEN please go to question 2.**"

A small number of questions in this section will require you to type in your response in the space provided.

1. Have you ever experienced vivid and realistic visual, auditory, tactile or other sensations **as you are falling asleep**? (Do **not** include dreams which occur during sleep).

    As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

    IF you answered 'No' THEN please go to question 2

    a. Have these sensations ever been terrifying?

        As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

    b. Have these sensations ever been accompanied by a 'sense of presence' i.e. a feeling that there is someone or something else nearby even though they cannot be seen or heard?

        As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

c. Have these sensations ever been accompanied by movements of your body or screams or other utterances?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

d. Have these sensations ever been accompanied by a feeling of confusion or disorientation?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

e. What sort of sensations have you experienced **as you are falling asleep?**

2. Have you ever been temporarily unable to perform voluntary movements and/or speak **as you are falling asleep**?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

IF you answered 'No' THEN please go to question 3

a. When this has occurred, have you ever felt unable to breathe?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

b. When this has occurred, have you ever felt as if something or someone was sitting on your chest?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

3. Have you ever experienced sensations of explosions and/or sensations of flashing lights in the head **as you are falling asleep**?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

IF you answered 'No' THEN please go to question 4

a. When this has occurred, has it ever been followed by a pounding heartbeat, sweating and/or heavy breathing?

As a child *No* ◯ *Once* ◯ *2-10 times* ◯ *11-20 times* ◯ *More than 20 times* ◯

4. Have you ever experienced vivid and realistic visual, auditory, tactile or other sensations **as you are waking from sleep**? (Do **not** include dreams which occur during sleep).

As a child *No* ◯ *Once* ◯ *2-10 times* ◯ *11-20 times* ◯ *More than 20 times* ◯

IF you answered 'No' THEN please go to question 5

a. Have these sensations ever been terrifying?

As a child *No* ◯ *Once* ◯ *2-10 times* ◯ *11-20 times* ◯ *More than 20 times* ◯

b. Have these sensations ever been accompanied by a 'sense of presence' i.e. a feeling that there is someone or something else nearby even though they cannot be seen or heard?

As a child *No* ◯ *Once* ◯ *2-10 times* ◯ *11-20 times* ◯ *More than 20 times* ◯

c. Have these sensations ever been accompanied by actual movements of your body or actual screams or other utterances?

As a child *No* ◯ *Once* ◯ *2-10 times* ◯ *11-20 times* ◯ *More than 20 times* ◯

d. Have these sensations ever been accompanied by a feeling of confusion or disorientation?

As a child *No* ◯ *Once* ◯ *2-10 times* ◯ *11-20 times* ◯ *More than 20 times* ◯

e. What sort of sensations have you experienced **as you are waking from sleep**?

5. Have you ever been temporarily unable to perform voluntary movements and/or speak **as you are waking from sleep**?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

IF you answered 'No' THEN please go to question 6

a. When this has occurred, have you ever felt unable to breathe?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

b. When this has occurred, have you ever felt as if something or someone was sitting on your chest?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

6. Have you ever been able to remember your dreams? (Do **not** include images that occur when you are only half asleep).

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

7. Have you ever been able to stop a dream which you did not like or to wake yourself up out of it? (Do **not** include images that occur when you are only half asleep).

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

8. Have you ever been able to control or create a dream which you did like? (Do **not** include images that occur when you are only half asleep).

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

9. Have you ever experienced dreams that you would call vivid? (Do **not** include images that occur when you are only half asleep).

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

10. Have you ever had a dream in which you were flying? (Do **not** include images that occur when you are only half asleep).

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

11. Have you ever had a dream in which you were falling? (Do **not** include images that occur when you are only half asleep).

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

12. Have you ever had a dream in which you **suspected** that you were dreaming and in which you thought about this question and/or tried to undertake various tests to determine whether you were awake or dreaming?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

13. Have you ever had a special sort of dream in which you knew **during the dream** that you were dreaming and felt that you possessed all of your waking capabilities?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

14. Have you ever felt that you have woken up only to discover later that you were only dreaming that you had woken up?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

15. Have you ever felt that you have woken up and found the atmosphere to be stressed, electrified or tense with a feeling of foreboding or expectancy, only to discover later that you were only dreaming that you had woken up?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

16. Have you ever experienced hypersomnolence-- sudden episodes of brief or long-lasting sleep occurring frequently and/or inappropriately during the daytime-- in spite of normally adequate amounts of nocturnal sleep?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

17. Have you ever experienced sudden transient weakness of muscle groups while awake, or sudden transient inability to speak while awake, occurring either with laughter, surprise, or without associated event?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

18. Have you ever felt disoriented or confused in terms of the time and where you are **after awakening** or **being awakened from sleep**?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

IF you answered 'No' THEN please go to question 19

a. Have your speech and/or your thoughts ever been severely impaired **after awakening from sleep**?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

b. Have you ever performed any inappropriate behaviour **just after awakening**, such as picking up a lamp to talk when you thought that the telephone had rung?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

19. Have you ever sat up in bed and/or got up and walked **whilst you were still asleep**?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

IF you answered 'No' THEN please go to question 20

a. Have you ever been difficult to awaken during one of these episodes?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

b. Did/do you usually remember these episodes yourself?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

20. Have you ever suddenly awoken from sleep with a scream or a shout and experienced bodily reactions which suggest intense fear?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

IF you answered 'No' THEN please go to question 21

a. Have you ever had a partial or total recall of these episodes yourself?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

b. When this has occurred, have you ever recalled any visual, auditory tactile or other sensations?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

c. When this has occurred, have you ever felt confused and disoriented?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

21. Have you ever performed any repetitive movements, such as headbanging, bodyrocking or rolling or humming, **as you are falling asleep**?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

22. Have you ever experienced sudden brief tensing (or jerking) of your legs and possibly your arms and/or your head **as you are falling asleep**?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

IF you answered 'No' THEN please go to question 23

a. When this has occurred, has it ever been accompanied by a feeling that you were falling?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

23. Have you ever spoken or made sounds **during your sleep** without being aware of this at the time?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

24. Have you ever awoken from sleep with/because of a painful sensation of muscular tightness or tension in your legs or your feet?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

25. Have you ever experienced a frightening dream which awakened you from your sleep?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

IF you answered 'No' THEN please go to question 26

a. When this has occurred, have you ever been able to recall the contents of the dream?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

b. When this has occurred, have you ever felt confused or disoriented upon awakening?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

26. Have you ever been aware, or been told, that you actually performed the movements associated with a dream, such as running, jumping, punching or kicking, **whilst you were still dreaming**?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

27. Have you ever been told, or have been aware yourself, that you grind or clench your teeth **whilst you are asleep**?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

28. Have you ever urinated involuntarily **whilst you are asleep** ? (Please do **not** include episodes which occurred **prior** to the completion of toilet-training)

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

29. Have you ever been told, or have been aware yourself, that you were snoring **whilst you were asleep**?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

30. Have you ever experienced a sudden awakening from sleep associated with a sense of choking?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

IF you answered 'No' THEN please go to Section B

a. When this has occurred, has it ever been accompanied by "gurgling" sounds in the throat?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

b. When this has occurred, has it ever been accompanied by a rapid heartbeat?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

c. When this has occurred, has it ever been accompanied by a feeling of intense anxiety?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

d. When this has occurred, has it ever been accompanied by a sensation of impending death?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

Please continue on to Section B

Section B

This section is concerned with imaginative abilities and role-playing which may have been part of your childhood.

Please read through the following statements carefully and decide whether each statement about your childhood is either 'True' or 'False'. Please do not spend too long on each question. Please use the mouse to click on the button to the right of the most appropriate response in each case.

31. When I was a child I believed in such beings as elves, witches, leprechauns, fairies, etc.

    True ○ *False* ○

32. When I was a child, I would dream or make-believe I was flying so clearly, that I felt as if I really did fly.

    True ○ *False* ○

33. When I was a child, I enjoyed fairytales.

    True ○ *False* ○

34. When I was a child, I was very good at make-believe and imagining.

    True ○ *False* ○

35. When I was a child, I spent time thinking about such things as the meaning of life, and death.

    True ○ *False* ○

36. When I was a young child (below age 8), I liked playing make-believe games such as cowboys, school, house, etc. I liked them better than games without make-believe such as checkers (draughts), building things, ball games, hopscotch, etc.

True ○ *False* ○

37. When I was playing make-believe games as a young child, I would make believe so well that what I pretended seemed real to me.

True ○ *False* ○

38. When I was a child, I lived in a make-believe world much or most of the time.

True ○ *False* ○

39. When I was a child, I believed that my doll(s) or stuffed animal(s) were alive and had feelings (that is, they could feel hurt, lonely, happy, etc.).

True ○ *False* ○

40. When I was a child, I had a pretend friend or companions such as a make-believe person, animal, or object which I talked to, or took along with me.

True ○ *False* ○

41. When I was a child, I would at times pretend and in some ways believe I was someone else such as a prince, princess, Snow White, Peter Pan, etc.

True ○ *False* ○

42. When I was a child, I was afraid at times that my pretending would become so real to me that I would be unable to stop it.

True ○ *False* ○

43. When I was a child, at least once, someone thought I was lying when I was just telling what I was making-believe.

True ○ *False* ○

44. When I was a child, I would spend at least half of the time I was awake pretending or imagining.

True ○ *False* ○

45. At times, when I was a child, it was hard for me to tell if something had actually happened

or if I made believe it happened.

True ○ *False* ○

Please continue on to Section C

Section C

Please read through the following questions carefully and estimate the number of times that each experience has occurred during your childhood and also during your adult life. Please do not spend too long on each question. Please use the mouse to click on the button to the right of the most appropriate response for 'As a child' and 'As an adult' in each case.

A small number of questions in this section will require you to type in your response in the space provided.

46. Have you ever had a rather clear and specific **dream** which matched in detail an event which occurred before, during, or after your dream, and which you did not know about or did not expect at the time of the dream?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

47. Have you ever had, while awake, a strong feeling, impression, or "vision" that a previously unexpected event had happened, was happening, or was going to happen, and learnt later that you were right?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

48. Have you ever seen an object move with no "natural" or physical means of motion that you could discover?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

49. Have you ever had an experience in which **you** healed or appeared to heal another person using the power of your mind alone?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

50. Have you ever had an experience in which **you** were healed or appeared to be healed by

another person using the power of their mind alone?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

51. Have you ever had, while fully awake, a vivid impression of seeing, hearing, or being touched by another being(s), which impression, as far as you could discover, was not due to any physical or "natural" cause? (Please do **not** include here experiences of the Christ, other religious figures or extra-terrestrials.)

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

52. Have you ever experienced an outbreak of noises, such as rapping, pounding, knocking or scratching, which was not due to any physical or "natural" cause as far as you could discover?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

53. Have you ever been bitten, scratched or pinched but could not discover any physical or "natural" cause for the experience?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

54. Have you ever "communicated" with the dead or believed yourself to have been controlled or "possessed" by a "spirit"?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

55. Have you ever had an experience in which you felt that "you" were located "outside of" or "away from" your physical body; that is, the feeling that your consciousness or center of awareness was at a different place than your physical body?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

56. Have you ever had a near-death-experience at a time when your life has been actually or almost threatened?

A near-death-experience might include some of the following features: a subjective sense of being dead, a feeling of peace, painlessness or pleasantness etc., a sense of bodily separation, a sense of entering a dark region, encountering a presence/hearing a voice, taking stock of one's life, seeing or being enveloped in light, seeing beautiful colours, entering into the light and/or encountering visible "spirits".

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

57. Have you ever had what seems to be a "memory" of a previous lifetime? (i.e., reincarnation)

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

58. Have you ever had a profound and deeply moving 'spiritual', 'mystical' or transcendental experience?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

59. Have you ever had the strong feeling or impression that you had been some place or in the same situation before, even though you had never actually been there before or were experiencing the event for the first time in "real life", i.e. a sense of déjà vu?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

60. Have you ever seen light or lights, or an energy field around any part of a person's body which, as far as you could tell, were not due to "normal" or "natural" causes? (i.e., a "halo" or "aura")

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

61. Have you ever had the experience of seeming to see **when your eyes were closed**?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

62. Have you ever seen an image of yourself in external space (i.e. not a reflection) which you have viewed **from within your own physical body**?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

IF you answered 'No' to BOTH 'As a child' and 'As an adult', THEN please go to question 63

a. What were you doing when this occurred?

b. Did the image speak to you?

Yes ○ *No* ○

63. Have you ever seen strange lights or objects in the sky in the distance that appeared to be unusual or that were making unusual movements?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

64. Have you ever seen an unidentified flying object (UFO) at close range?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

65. Have you ever had some form of visual, verbal, physical or telepathic contact with the occupants of an unidentified flying object (UFO)?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

66. Have you ever been on board an unidentified flying object (UFO)?

As a child *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

As an adult *No* ○ *Once* ○ *2-10 times* ○ *11-20 times* ○ *More than 20 times* ○

Please continue on to Section D

Section D

This section is concerned with your everyday attitudes and traits and your beliefs about the existence of processes and experiences which might be beyond current scientific understanding.

Please read through the following statements and decide whether you consider each statement to be 'True', 'Uncertain' or 'False'. Please do not spend too long on each question. Please use the mouse to click on the button to the right of the most appropriate response in each case.

67. I believe in the existence of ESP (extrasensory perception).

    True ○ *Uncertain* ○ *False* ○

68. I believe it is possible to gain information about the future before it happens, in ways that do not depend on rational prediction or normal sensory channels.

    True ○ *Uncertain* ○ *False* ○

69. I like to gossip at times.

    True ○ *Uncertain* ○ *False* ○

70. I believe that it is possible to gain information about the thoughts, feelings or circumstances of another person, in a way that does not depend on rational prediction or normal sensory channels.

    True ○ *Uncertain* ○ *False* ○

71. There have been occasions when I took advantage of someone.

    True ○ *Uncertain* ○ *False* ○

72. I believe that it is possible to send a "mental message" to another person, or in some way influence them at a distance, by means other than the normal channels of communication.

    True ○ *Uncertain* ○ *False* ○

73. I'm always willing to admit it when I make a mistake.

True ○ *Uncertain* ○ *False* ○

74. I believe in the existence of psychokinesis (or "PK"), that is, the direct influence of mind on a physical system, without the mediation of any known physical energy.

True ○ *Uncertain* ○ *False* ○

75. I believe that it is possible to heal another person via the direct influence of mind without the mediation of any known physical energy.

True ○ *Uncertain* ○ *False* ○

76. I always try to practice what I preach.

True ○ *Uncertain* ○ *False* ○

77. I believe in life after death.

True ○ *Uncertain* ○ *False* ○

78. I believe that some people can contact spirits of the dead.

True ○ *Uncertain* ○ *False* ○

79. I sometimes try to get even rather than forgive and forget.

True ○ *Uncertain* ○ *False* ○

80. I believe that it is possible for a deceased person to be seen, heard or felt by a living person during their normal waking state.

True ○ *Uncertain* ○ *False* ○

81. At times I have really insisted on having things my own way.

True ○ *Uncertain* ○ *False* ○

82. I believe that it is possible for an outbreak of noises, such as rapping, pounding, knocking or scratching, to occur which does not seem to be due to any physical or natural cause.

True ◯ *Uncertain* ◯ *False* ◯

83. There have been occasions when I felt like smashing things.

True ◯ *Uncertain* ◯ *False* ◯

84. I believe that it is possible for a person to separate their consciousness or centre of awareness from their physical body in circumstances in which they do not perceive their life to be in danger.

True ◯ *Uncertain* ◯ *False* ◯

85. I believe that it is possible for a person to separate their consciousness or centre of awareness from their physical body in circumstances in which their life is actually or almost threatened.

True ◯ *Uncertain* ◯ *False* ◯

86. I never resent being asked to return a favor.

True ◯ *Uncertain* ◯ *False* ◯

87. I believe that it is possible for a person to recall memories of a previous lifetime (i.e., reincarnation).

True ◯ *Uncertain* ◯ *False* ◯

88. I have never been annoyed when people expressed ideas very different from my own.

True ◯ *Uncertain* ◯ *False* ◯

89. I believe that some people can have profound and deeply moving ‘spiritual’, ‘mystical’ or transcendental experiences.

True ◯ *Uncertain* ◯ *False* ◯

90. I believe that some people can have the strong feeling or impression that they have been some place or in the same situation before, even though they have never actually been there before or are experiencing the event for the first time in real life.

True ◯ *Uncertain* ◯ *False* ◯

91. I have never deliberately said something that hurt someone's feelings.

True ○ *Uncertain* ○ *False* ○

92. I believe that some people are able to see a light or lights or an energy field around any part of another person's body, which are not due to normal or natural causes (i.e., a halo or aura).

True ○ *Uncertain* ○ *False* ○

93. I believe that there is intelligent life on other planets.

True ○ *Uncertain* ○ *False* ○

94. I believe that intelligent life-forms from other planets have visited Earth.

True ○ *Uncertain* ○ *False* ○

95. I believe that intelligent life-forms from other planets have communicated with people here on Earth.

True ○ *Uncertain* ○ *False* ○

96. I believe that intelligent life-forms from other planets have allowed people from Earth on board their vehicles.

True ○ *Uncertain* ○ *False* ○

Please continue on to Section E

Section E

It would be helpful, in terms of analysing the results of this study, if respondents with similar characteristics could be grouped together to allow additional comparisons to be made. For this reason it would be appreciated if you could provide some additional information about yourself. Please use the mouse to click on the button or box to the right of the most appropriate response in each case.

A small number of questions in this section will require you to type in your response in the space provided.

97. Your Sex:

Male ○ *Female* ○

98. Your Age (in years):

99. Your Nationality (e.g. British):

100. Your Level of Education:

Please tick the box(es) that apply

I have completed my compulsory school education. ☐
I have completed school or college courses at pre-degree level. ☐
I have completed an undergraduate degree. ☐
I have completed a master's degree or a postgraduate certificate or diploma. ☐
I have completed a doctoral degree. ☐
Other qualifications (please specify)

101. Do you/have you ever had to work shifts as part of any of your present or past jobs?

Yes ○ *No* ○

a. If 'Yes' please indicate when:

I work shifts at present ☐ *I have worked shifts in the past* ☐

102. Do you travel into different time zones more than twice a year?

Yes ○ *No* ○

a. If 'Yes', approximately how many times per year?

103. Is there/has there ever been anything which has regularly caused disruptions to your sleeping patterns?

Yes ○ *No* ○

a. If 'Yes', please could you describe the cause of the disruption(s) in the space below.

104. Do you suffer or have you ever suffered from any recurrent medical conditions or major

illnesses?

Yes ○ *No* ○

a. If 'Yes', please could you indicate what they are in the space below.

105. Do you take or have you ever had to take any form of prescribed medication over a relatively long period of time?

Yes ○ *No* ○

a. If 'Yes', please could you indicate what it is/was in the space below.

106. Do you use any of the following substances?

a. Caffeine e.g. tea, coffee, coca-cola

Never ○ *1-2 times per year* ○ *1-2 times per month* ○ *1-2 times a week* ○ *Daily* ○

b. Alcohol e.g. beer, wine, spirits (liquor)

Never ○ *1-2 times per year* ○ *1-2 times per month* ○ *1-2 times a week* ○ *Daily* ○

c. Nicotine e.g. cigarettes, cigars, pipe, chewing gum, patch

Never ○ *1-2 times per year* ○ *1-2 times per month* ○ *1-2 times a week* ○ *Daily* ○

107. Do you practise or have you ever practised any form of mental discipline, exercise or self-improvement program such as meditation, yoga, tai chi, aikido, relaxation exercises, hypnosis, biofeedback or psychotherapy?

Yes ○ *No* ○

a. If 'Yes', please could you indicate which in the space below.

Please continue on to the Feedback Section

Feedback Section

108. In order to improve this questionnaire for use in the future, any comments regarding difficulties which you may have encountered whilst answering this questionnaire would be welcomed as well as any suggestions regarding possible improvements.

Please write any comments or suggestions in the space below:

PLEASE PRESS HERE TO SEND IN YOUR COMPLETED RESPONSES

Thank you very much for completing this questionnaire.

If you would like to receive a brief summary of the results of this survey and/or you would be interested in participating in future research, please send an e-mail to sherwood@holyrood.ed.ac.uk or write to me at the Koestler Parapsychology Unit (see address on KPU homepage) **once you have sent in your completed responses.**

Back to Koestler Parapsychology Unit (KPU) Homepage

SURVEY OF CHILDHOOD AND ADULTHOOD SLEEPING AND WAKING EXPERIENCES

Simon Sherwood

INTRODUCTION

Your participation in this research would be greatly appreciated. This survey will form part of my PhD thesis in Psychology at the University of Edinburgh. The aims of this survey are:

- to assess the relative frequency of (and possible relationships between) childhood experiences which can occur before, during and after a period of sleep.
- to assess the relative frequency of some childhood abilities such as imagining and role-playing.
- to assess the relative frequency of (and possible relationships between) some childhood and adulthood experiences which might be considered, by some people, to be beyond current scientific understanding.

CONFIDENTIALITY

Your responses to this questionnaire will remain **completely confidential**. Information about individuals will **not** be divulged to any other parties nor will individuals be able to be identified in any subsequent reports.

NOTES ON COMPLETION

For the purposes of this survey, 'childhood' and 'adulthood' will be defined as follows:

Childhood - from the age of 2 up until the age of 18.
Adulthood - from the age of 18 upwards.

Childhood experiences may be more difficult to remember than those occurring in adulthood. Please try to give as accurate an estimate as you can. Some experiences may be relatively more common than others and therefore not everyone will have had some or all of the experiences listed. If you are uncertain whether or not you have had a particular experience (regardless of how others might interpret such an experience) then please answer 'No'.

The focus of this survey is on the experiences themselves rather than on the possible interpretations of these experiences. **There are no right or wrong answers in this survey**.

Section A

This section is concerned with a number of different childhood experiences which can occur just before, during or just after a period of sleep.

Please read through the following questions carefully and estimate the number of times that each experience has occurred during your childhood. Please do not spend too long on each question. Please circle the most appropriate response in each case.

If a particular question does not apply to you, you may be asked to move on to another question. For example "**IF you answered 'No' THEN please go to question 2.**"

A small number of questions in this section will require you to type in your response in the space provided.

1. Have you ever experienced vivid and realistic visual, auditory, tactile or other sensations **as you are falling asleep**? (Do **not** include dreams which occur during sleep).

   As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

   IF you answered 'No' THEN please go to question 2

   a. Have these sensations ever been terrifying?

   As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

   b. Have these sensations ever been accompanied by a 'sense of presence' i.e. a feeling that there is someone or something else nearby even though they cannot be seen or heard?

   As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

   c. Have these sensations ever been accompanied by movements of your body or screams or other utterances?

   As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

   d. Have these sensations ever been accompanied by a feeling of confusion or disorientation?

   As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

   e. What sort of sensations have you experienced **as you are falling asleep**?

2. Have you ever been temporarily unable to perform voluntary movements and/or speak **as you are falling asleep**?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

IF you answered 'No' THEN please go to question 3

a. When this has occurred, have you ever felt unable to breathe?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

b. When this has occurred, have you ever felt as if something or someone was sitting on your chest?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

3. Have you ever experienced sensations of explosions in the head **as you are falling asleep**?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

IF you answered 'No' THEN please go to question 4

a. When this has occurred, has it ever been followed by a pounding heartbeat, sweating and/or heavy breathing?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

4. Have you ever experienced vivid and realistic visual, auditory, tactile or other sensations **as you are waking from sleep**? (Do **not** include dreams which occur during sleep).

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

IF you answered 'No' THEN please go to question 5

a. Have these sensations ever been terrifying?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

b. Have these sensations ever been accompanied by a 'sense of presence' i.e. a feeling that there is someone or something else nearby even though they cannot be seen or heard?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

c. Have these sensations ever been accompanied by actual movements of your body or actual screams or other utterances?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

d. Have these sensations ever been accompanied by a feeling of confusion or disorientation?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

e. What sort of sensations have you experienced **as you are waking from sleep**?

5. Have you ever been temporarily unable to perform voluntary movements and/or speak **as you are waking from sleep**?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

<u>IF you answered 'No' THEN please go to question 6</u>

a. When this has occurred, have you ever felt unable to breathe?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

b. When this has occurred, have you ever felt as if something or someone was sitting on your chest?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

6. Have you ever been able to remember your dreams? (Do **not** include images that occur when you are only half asleep).

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

7. Have you ever been able to stop a dream which you did not like or to wake yourself up out of it? (Do **not** include images that occur when you are only half asleep).

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

8. Have you ever been able to control or create a dream which you did like? (Do **not** include images that occur when you are only half asleep).

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

9. Have you ever experienced dreams that you would call vivid? (Do **not** include images that occur when you are only half asleep).

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

10. Have you ever had a dream in which you were flying? (Do **not** include images that occur when you are only half asleep).

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

11. Have you ever had a dream in which you were falling? (Do **not** include images that occur when you are only half asleep).

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

12. Have you ever had a dream in which you **suspected** that you were dreaming and in which you thought about this question and/or tried to undertake various tests to determine whether you were awake or dreaming?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

13. Have you ever had a special sort of dream in which you knew **during the dream** that you were dreaming and felt that you possessed all of your waking capabilities?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

14. Have you ever felt that you have woken up only to discover later that you were only dreaming that you had woken up?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

15. Have you ever felt that you have woken up and found the atmosphere to be stressed, electrified or tense with a feeling of foreboding or expectancy, only to discover later that you were only dreaming that you had woken up?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

16. Have you ever experienced hypersomnolence-- sudden episodes of brief or long-lasting sleep occurring frequently and/or inappropriately during the daytime-- in spite of normally adequate amounts of nocturnal sleep?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

17. Have you ever experienced sudden transient weakness of muscle groups while awake, or sudden transient inability to speak while awake, occurring either with laughter, surprise, or without associated event?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

18. Have you ever felt disoriented or confused in terms of the time and where you are after awakening or being awakened from sleep?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

IF you answered 'No' THEN please go to question 19

a. Have your speech and/or your thoughts ever been severely impaired **after awakening from sleep**?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

b. Have you ever performed any inappropriate behaviour **just after awakening**, such as picking up a lamp to talk when you thought that the telephone had rung?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

19. Have you ever sat up in bed and/or got up and walked **whilst you were still asleep**?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

IF you answered 'No' THEN please go to question 20

a. Have you ever been difficult to awaken during one of these episodes?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

b. Did/do you usually remember these episodes yourself?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

20. Have you ever suddenly awoken from sleep with a scream or a shout and experienced bodily reactions which suggest intense fear?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

IF you answered 'No' THEN please go to question 21

a. Have you ever had a partial or total recall of these episodes yourself?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

b. When this has occurred, have you ever recalled any visual, auditory tactile or other sensations?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

c. When this has occurred, have you ever felt confused and disoriented?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

21. Have you ever performed any repetitive movements, such as headbanging, bodyrocking or rolling or humming, **as you are falling asleep**?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

22. Have you ever experienced sudden brief tensing (or jerking) of your legs and possibly your arms and/or your head **as you are falling asleep**?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

IF you answered 'No' THEN please go to question 23

a. When this has occurred, has it ever been accompanied by a feeling that you were falling?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

23. Have you ever spoken or made sounds **during your sleep** without being aware of this at the time?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

24. Have you ever awoken from sleep with/because of a painful sensation of muscular tightness or tension in your legs or your feet?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

25. Have you ever experienced a frightening dream which awakened you from your sleep?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

IF you answered 'No' THEN please go to question 26

a. When this has occurred, have you ever been able to recall the contents of the dream?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

b. When this has occurred, have you ever felt confused or disoriented upon awakening?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

26. Have you ever been aware, or been told, that you actually performed the movements associated with a dream, such as running, jumping, punching or kicking, **whilst you were still dreaming**?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

27. Have you ever been told, or have been aware yourself, that you grind or clench your teeth **whilst you are asleep**?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

28. Have you ever urinated involuntarily **whilst you are asleep** ? (Please do **not** include episodes which occurred **prior** to the completion of toilet-training)

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

29. Have you ever been told, or have been aware yourself, that you were snoring **whilst you were asleep**?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

30. Have you ever experienced a sudden awakening from sleep associated with a sense of choking?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

IF you answered 'No' THEN please go to Section B

a. When this has occurred, has it ever been accompanied by "gurgling" sounds in the throat?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

b. When this has occurred, has it ever been accompanied by a rapid heartbeat?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

c. When this has occurred, has it ever been accompanied by a feeling of intense anxiety?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

d. When this has occurred, has it ever been accompanied by a sensation of impending death?

As a child *No* *Once* *2-10 times* *11-20 times* *More than 20 times*

Please continue on to Section B

Section B

This section is concerned with imaginative abilities and role-playing which may have been part of your childhood.

Please read through the following statements carefully and decide whether each statement about your childhood is either 'True' or 'False'. Please do not spend too long on each question. Please circle the most appropriate response in each case.

31. When I was a child I believed in such beings as elves, witches, leprechauns, fairies, etc.

True *False*

32. When I was a child, I would dream or make-believe I was flying so clearly, that I felt as if I really did fly.

    True *False*

33. When I was a child, I enjoyed fairytales.

    True *False*

34. When I was a child, I was very good at make-believe and imagining.

    True *False*

35. When I was a child, I spent time thinking about such things as the meaning of life, and death.

    True *False*

36. When I was a young child (below age 8), I liked playing make-believe games such as cowboys, school, house, etc. I liked them better than games without make-believe such as checkers (draughts), building things, ball games, hopscotch, etc.

    True *False*

37. When I was playing make-believe games as a young child, I would make believe so well that what I pretended seemed real to me.

    True *False*

38. When I was a child, I lived in a make-believe world much or most of the time.

    True *False*

39. When I was a child, I believed that my doll(s) or stuffed animal(s) were alive and had feelings (that is, they could feel hurt, lonely, happy, etc.).

    True *False*

40. When I was a child, I had a pretend friend or companions such as a make-believe person, animal, or object which I talked to, or took along with me.

    True *False*

41. When I was a child, I would at times pretend and in some ways believe I was someone else such as a prince, princess, Snow White, Peter Pan, etc.

    True *False*

42. When I was a child, I was afraid at times that my pretending would become so real to me that I would be unable to stop it.

True *False*

43. When I was a child, at least once, someone thought I was lying when I was just telling what I was making-believe.

True *False*

44. When I was a child, I would spend at least half of the time I was awake pretending or imagining.

True *False*

45. At times, when I was a child, it was hard for me to tell if something had actually happened or if I made believe it happened.

True *False*

Please continue on to Section C

Section C

Please read through the following questions carefully and estimate the number of times that each experience has occurred during your childhood and also during your adult life. Please do not spend too long on each question. Please circle the most appropriate response for 'As a child' and 'As an adult' in each case.

A small number of questions in this section will require you to write in your response in the space provided.

46. Have you ever had a rather clear and specific **dream** which matched in detail an event which occurred before, during, or after your dream, and which you did not know about or did not expect at the time of the dream?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

47. Have you ever had, while awake, a strong feeling, impression, or "vision" that a previously unexpected event had happened, was happening, or was going to happen, and learnt later that you were right?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

48. Have you ever seen an object move with no "natural" or physical means of motion that you could discover?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

49. Have you ever had an experience in which **you** healed or appeared to heal another person using the power of your mind alone?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

50. Have you ever had an experience in which **you** were healed or appeared to be healed by another person using the power of their mind alone?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

51. Have you ever had, while fully awake, a vivid impression of seeing, hearing, or being touched by another being(s), which impression, as far as you could discover, was not due to any physical or "natural" cause? (Please do **not** include here experiences of the Christ, other religious figures or extra-terrestrials.)

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

52. Have you ever experienced an outbreak of noises, such as rapping, pounding, knocking or scratching, which was not due to any physical or "natural" cause as far as you could discover?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

53. Have you ever been bitten, scratched or pinched but could not discover any physical or "natural" cause for the experience?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

54. Have you ever "communicated" with the dead or believed yourself to have been controlled or "possessed" by a "spirit"?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

55. Have you ever had an experience in which you felt that "you" were located "outside of" or "away from" your physical body; that is, the feeling that your consciousness or center of awareness was at a different place than your physical body?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

56. Have you ever had a near-death-experience at a time when your life has been actually or almost threatened?

A near-death-experience might include some of the following features: a subjective sense of being dead, a feeling of peace, painlessness or pleasantness etc., a sense of bodily separation, a sense of entering a dark region, encountering a presence/hearing a voice, taking stock of one's life, seeing or being enveloped in light, seeing beautiful colours, entering into the light and/or encountering visible "spirits".

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

57. Have you ever had what seems to be a "memory" of a previous lifetime? (i.e., reincarnation)

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

58. Have you ever had a profound and deeply moving 'spiritual', 'mystical' or transcendental experience?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

59. Have you ever had the strong feeling or impression that you had been some place or in the same situation before, even though you had never actually been there before or were experiencing the event for the first time in "real life", i.e. a sense of déjà vu?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

60. Have you ever seen light or lights, or an energy field around any part of a person's body which, as far as you could tell, were not due to "normal" or "natural" causes? (i.e., a "halo" or "aura")

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

61. Have you ever had the experience of seeming to see **when your eyes were closed**?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

62. Have you ever seen an image of yourself in external space (i.e. not a reflection) which you have viewed from within your own physical body?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

IF you answered 'No' to BOTH 'As a child' and 'As an adult', THEN please go to question 63

a. What were you doing when this occurred?

b. Did the image speak to you?

Yes *No*

63. Have you ever seen strange lights or objects in the sky in the distance that appeared to be unusual or that were making unusual movements?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

64. Have you ever seen an unidentified flying object (UFO) at close range?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

65. Have you ever had some form of visual, verbal, physical or telepathic contact with the occupants of an unidentified flying object (UFO)?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

66. Have you ever been on board an unidentified flying object (UFO)?

As a child	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*
As an adult	*No*	*Once*	*2-10 times*	*11-20 times*	*More than 20 times*

Please continue on to Section D

Section D

This section is concerned with your everyday attitudes and traits and your beliefs about the existence of processes and experiences which might be beyond current scientific understanding.

Please read through the following statements and decide whether you consider each statement to be 'True', 'Uncertain' or 'False'. Please do not spend too long on each question. Please circle the most appropriate response in each case.

67. I believe in the existence of ESP (extrasensory perception).

    True *Uncertain* *False*

68. I believe it is possible to gain information about the future before it happens, in ways that do not depend on rational prediction or normal sensory channels.

    True *Uncertain* *False*

69. I like to gossip at times.

    True *Uncertain* *False*

70. I believe that it is possible to gain information about the thoughts, feelings or circumstances of another person, in a way that does not depend on rational prediction or normal sensory channels.

    True *Uncertain* *False*

71. There have been occasions when I took advantage of someone.

    True *Uncertain* *False*

72. I believe that it is possible to send a "mental message" to another person, or in some way influence them at a distance, by means other than the normal channels of communication.

    True *Uncertain* *False*

73. I'm always willing to admit it when I make a mistake.

    True *Uncertain* *False*

74. I believe in the existence of psychokinesis (or "PK"), that is, the direct influence of mind on a physical system, without the mediation of any known physical energy.

    True *Uncertain* *False*

75. I believe that it is possible to heal another person via the direct influence of mind without the mediation of any known physical energy.

True *Uncertain* *False*

76. I always try to practice what I preach.

True *Uncertain* *False*

77. I believe in life after death.

True *Uncertain* *False*

78. I believe that some people can contact spirits of the dead.

True *Uncertain* *False*

79. I sometimes try to get even rather than forgive and forget.

True *Uncertain* *False*

80. I believe that it is possible for a deceased person to be seen, heard or felt by a living person during their normal waking state.

True *Uncertain* *False*

81. At times I have really insisted on having things my own way.

True *Uncertain* *False*

82. I believe that it is possible for an outbreak of noises, such as rapping, pounding, knocking or scratching, to occur which does not seem to be due to any physical or natural cause.

True *Uncertain* *False*

83. There have been occasions when I felt like smashing things.

True *Uncertain* *False*

84. I believe that it is possible for a person to separate their consciousness or centre of awareness from their physical body in circumstances in which they do not perceive their life to be in danger.

True *Uncertain* *False*

85. I believe that it is possible for a person to separate their consciousness or centre of awareness from their physical body in circumstances in which their life is actually or almost threatened.

True *Uncertain* *False*

86. I never resent being asked to return a favor.

True *Uncertain* *False*

87. I believe that it is possible for a person to recall memories of a previous lifetime (i.e., reincarnation).

True *Uncertain* *False*

88. I have never been annoyed when people expressed ideas very different from my own.

True *Uncertain* *False*

89. I believe that some people can have profound and deeply moving 'spiritual', 'mystical' or transcendental experiences.

True *Uncertain* *False*

90. I believe that some people can have the strong feeling or impression that they have been some place or in the same situation before, even though they have never actually been there before or are experiencing the event for the first time in real life.

True *Uncertain* *False*

91. I have never deliberately said something that hurt someone's feelings.

True *Uncertain* *False*

92. I believe that some people are able to see a light or lights or an energy field around any part of another person's body, which are not due to normal or natural causes (i.e., a halo or aura).

True *Uncertain* *False*

93. I believe that there is intelligent life on other planets.

True *Uncertain* *False*

94. I believe that intelligent life-forms from other planets have visited Earth.

True *Uncertain* *False*

95. I believe that intelligent life-forms from other planets have communicated with people here on Earth.

True *Uncertain* *False*

96. I believe that intelligent life-forms from other planets have allowed people from Earth on board their vehicles.

True *Uncertain* *False*

Please continue on to Section E

Section E

It would be helpful, in terms of analysing the results of this study, if respondents with similar characteristics could be grouped together to allow additional comparisons to be made. For this reason it would be appreciated if you could provide some additional information about yourself. Please circle or tick the most appropriate response in each case.

A small number of questions in this section will require you to write in your response in the space provided.

97. Your Sex:

Male *Female*

98. Your Age (in years): _____

99. Your Nationality (e.g. British): ____________________

100. Your Level of Education:

Please tick the box(es) that apply

I have completed my compulsory school education. ☐
I have completed school or college courses at pre-degree level. ☐
I have completed an undergraduate degree. ☐
I have completed a master's degree or a postgraduate certificate or diploma. ☐
I have completed a doctoral degree. ☐
Other qualifications (please specify)__________________________________

101. Do you/have you ever had to work shifts as part of any of your present or past jobs?

Yes *No*

a. If 'Yes' please indicate when:

I work shifts at present *I have worked shifts in the past*

102. Do you travel into different time zones more than twice a year?

Yes *No*

a. If 'Yes', approximately how many times per year? _____

103. Is there/has there ever been anything which has regularly caused disruptions to your sleeping patterns?

Yes *No*

a. If 'Yes', please could you describe the cause of the disruption(s) in the space below.

104. Do you suffer or have you ever suffered from any recurrent medical conditions or major illnesses?

Yes *No*

a. If 'Yes', please could you indicate what they are in the space below.

105. Do you take or have you ever had to take any form of prescribed medication over a relatively long period of time?

Yes *No*

a. If 'Yes', please could you indicate what it is/was in the space below.

106. Do you use any of the following substances?

a. Caffeine e.g. tea, coffee, coca-cola

Never *1-2 times per year* *1-2 times per month* *1-2 times a week* *Daily*

b. Alcohol e.g. beer, wine, spirits (liquor)

Never *1-2 times per year* *1-2 times per month* *1-2 times a week* *Daily*

c. Nicotine e.g. cigarettes, cigars, pipe, chewing gum, patch

Never *1-2 times per year* *1-2 times per month* *1-2 times a week* *Daily*

107. Do you practise or have you ever practised any form of mental discipline, exercise or self-improvement program such as meditation, yoga, tai chi, aikido, relaxation exercises, hypnosis, biofeedback or psychotherapy?

Yes *No*

a. If 'Yes', please could you indicate which in the space below.

Please continue on to the Feedback Section

Feedback Section

108. In order to improve this questionnaire for use in the future, any comments regarding difficulties which you may have encountered whilst answering this questionnaire would be welcomed as well as any suggestions regarding possible improvements.

Please write any comments or suggestions in the space below:

Thank you very much for completing this questionnaire.

If you would like to receive a brief summary of the results of this survey and/or you would be interested in participating in future research, please send an e-mail to Simon.Sherwood@northampton.ac.uk once you have sent in your completed responses.

Please place your completed questionnaire in the box provided outside my office (F18b).

Dreaming, Vol. 10, No. 4, 2000

Dream Clairvoyance Study II Using Dynamic Video-Clips: Investigation of Consensus Voting Judging Procedures and Target Emotionality

Simon J. Sherwood,[1,2] Kathy Dalton,[1] Fiona Steinkamp,[1] and Caroline Watt[1]

This partial replication study investigated whether individual versus small group consensus target judging procedures, and/or the emotionality of dynamic target video clips, would affect the frequency of correct identification of the target in a free-response dream ESP study. Two people located in Edinburgh (Scotland) and a third person located in Derby (England) acted both as experimenters and as participants and slept at their respective homes. On each of the 28 trial nights, a randomly-selected video clip was shown repeatedly between 3.00–4.30 am. The following morning the participants viewed four video clips (i.e., 3 decoys plus the target) and then judged the correspondences between the clips and records of their dream mentation. The Edinburgh participants obtained a greater number of direct hits using consensus as opposed to individual judgements. A discussion consensus procedure was marginally more successful than a more objective consensus procedure (12 hits, p = .0294, ES(h) = 0.38 vs. 11 hits, p = .0679, ES(h) = 0.30). Participants, both as a group and as individuals, obtained a greater proportion of direct hits when the target was emotionally negative than when it was either positive or neutral.

KEY WORDS: extrasensory perception; parapsychology; emotionality; consensus voting.

INTRODUCTION

According to a recent definition, "*Parapsychology* is the scientific study of experiences which, if they are as they seem to be, are in principle outside the realm of human capabilities as presently conceived by conventional scientists" (Irwin, 1999, p. 1). Parapsychologists typically study three broad domains of experiences: extrasensory perception (ESP), psychokinesis (PK), and phenomena that relate to the question of survival of bodily death. The generic term 'psi phenomena', introduced by Wiesner, (cited by Irwin, 1999, p. 8) is sometimes used to refer to ESP and PK phenomena.

This study was concerned with an investigation of evidence for ESP (more specifically, clairvoyance) during dreams. What do we mean by ESP? As defined by Irwin (1999,

[1] Department of Psychology, The University of Edinburgh, Scotland, UK.
[2] Correspondence should be directed to Simon Sherwood, Division of Psychology, University College Northampton, Park Campus, Boughton Green Road, Northampton NN2 7AL, UK; e-mail: simon.sherwood@northampton.ac.uk.

1053-0797/00/1200-0221$18.00/1 © 2000 Association for the Study of Dreams

p. 6), "An *extrasensory experience* is one in which it appears that the experient's mind has acquired information directly, that is, seemingly without either the mediation of the recognized human senses or the processes of logical inference." ESP can be further classified according to the source or the temporal reference of the information: telepathy (information obtained from another person), clairvoyance (information about events or objects obtained from the environment), precognition (information about future events), and retrocognition (information about past events).

A large proportion, estimated to be 33–65% (Van de Castle, 1977), of spontaneous cases of extrasensory perception (ESP) have been reported during dreams (e.g., Gurney, Myers, & Podmore, 1886). As it is difficult to predict and to have control over when spontaneous ESP experiences are going to occur and to whom, parapsychologists have tried to develop experimental conditions that will facilitate the operation of ESP and help to rule out normal methods of communication.

Some experimental research has found that dreams (e.g., Braud, 1977; Child, Kanthamani, & Sweeney, 1977; Dalton, Steinkamp, & Sherwood, in press; Kanthamani, Khilji, & Rustomji-Kerns, 1989; Kanthamani & Khilji, 1990; Kanthamani & Broughton, 1992; Ullman, Krippner, with Vaughan, 1989; Van de Castle, 1971) and hypnagogic/ hypnopompic imagery (Braud, 1977; Gertz, 1983; White, Krippner, Ullman, & Honorton, 1971) seem to be conducive to ESP.

The Maimonides dream studies (Ullman et al., 1989), which mainly investigated dream telepathy, are undoubtedly the most well known and most successful (Child, 1985). A recent meta-analysis of 450 Maimonides dream telepathy sessions found the overall hit rate to be 63% (mean chance expectation (MCE) = 50%) with odds against chance of 75 million to one (Radin, 1997). Attempted replications of the Maimonides dream studies have not been so successful, though the conditions surrounding these attempts may not have been particularly conducive (see Van de Castle, 1977).

Dynamic Targets

The dream ESP studies represented a move away from the early forced-choice methods, pioneered by the Rhines, towards free-response methods. With forced-choice methods, each response by the participant is confined to a fixed and limited number of alternatives (e.g., one of five different Zener card symbols); with free-response methods, the participant is free to give more detailed responses in as many different ways as they wish (see Milton & Wiseman, 1997, Palmer, 1986a). Most dream ESP studies have used static target materials, such as art prints or slides, though some studies have used more dynamic target materials such as projector slides with an accompanying soundtrack, a person performing mimes, or films/videos. Other free-response ESP research has suggested that dynamic and multi-sensory targets might be more conducive to ESP than static targets (Dalton & Utts, 1995; Delanoy, 1989; Honorton, Berger, Varvoglis, Quant, Derr, Schecter, & Ferrari, 1990). Both this, and also our previous dream study, used dynamic video clips with accompanying soundtracks as targets.

Emotionality of Targets

Spontaneous cases of dream ESP often feature information about close relatives or friends and/or depict negative life events (Ullman et al., 1989; Van de Castle, 1977). However, although some literature and anecdotal observations suggest that emotional targets are believed to be better than non-emotional targets (e.g., Cavanna, & Servadio, 1964 cited by Delanoy, 1988; Dalton, 1997a; Ullman et al., 1989; Van de Castle, 1977; Watt, 1989), the experimental findings are equivocal (Delanoy, 1988, 1989).

Evidence from some experimental studies of ESP suggests that emotional target materials are more conducive than neutral materials (Bierman, 1995, 1997; Moss & Gengerelli, 1968 cited by Gelade & Harvie, 1975; Johnson, 1971; Radin, 1997; Williams & Duke, 1979); other studies suggest that neutral targets may be more conducive than emotional (Sondow, Braud, & Barker, 1981).

Moreover, it is not clear whether positive or negative emotional targets are more psi-conducive as studies that have compared these target qualities have also produced conflicting results (Delanoy, 1989). Some studies have discovered that positive materials seem to have a larger effect than negative materials (Dalton, 1997b; Johnson, 1971; Johnson & Nordbeck cited by Johnson, 1971; Radin, 1997; Williams & Duke, 1979); others have found the opposite (Dalton, personal communication, November 18, 1998; Dalton et al., in press; Krippner & Zeichner, 1974); or no significant difference (Eisenberg & Donderi, 1979 cited by Delanoy, 1988; Sondow et al., 1981). The studies cited here, which found that negative targets were superior to positive, were all dream, as opposed to waking or ganzfeld, ESP studies. Thus, it seems that, with dream ESP, negative targets might be particularly likely to be identified correctly.

In both this and our previous study, all of the video clips in the target pool had been rated by independent judges and classified as being either positive, negative or neutral in terms of their emotional content. This study attempted to address the emotionality question by comparing the direct hit rate (i.e., the number of times the target clip was correctly identified) for positive, negative and emotionally neutral target video clips. More specifically, it was hypothesized that the group would score significantly higher than the mean chance expectation (i.e., the number of times we would expect the target clip to be correctly identified simply by chance) when the targets were negative. This was in keeping with the finding of a similar study carried out at Edinburgh that involved testing for dream clairvoyance using dynamic video targets and a consensus judging procedure (Dalton et al., in press).

Small Group Participation and Consensus Judgement Procedures

Some studies have used majority-vote or pooled rating/ranking procedures in order to try to maximise ESP performance (Fiske & West, 1956, 1957; Kennedy, 1979; Ryzl, 1966; Taetzsch, 1962; Thouless, 1960—cited by Carpenter, 1991; Braud, 1977; Kanthamani et al., 1989; Kanthamani & Khilji, 1990). With these consensus judgement procedures, the responses from a number of individuals are combined to give a single judgement as to the identity of the target on a given trial.

Carpenter (1995) has been using group consensus judgements of the contents of regular quasi-psychotherapeutic group meetings as a method of facilitating ESP. Ullman (1989) has also been conducting exploratory research with small groups to see if their dreams are conducive to ESP. Our previous dream ESP study, using a consensus vote judging procedure that involved three participants, found that this method yielded a higher number of direct hits than individual judgements (Dalton et al., in press).[3] In our previous study, the consensus

[3]Dalton (personal communication, November 18, 1998) reported an attempted replication of this first study by students at the University of California-Davis (Dalton, Novotny, Sickafoose, Burrone, & Phillips, in preparation). At the end of the 16 trials, the group (4 participants) scored significantly higher than chance using an objective consensus judging method; as individuals their scores were non-significant.

rankings were based upon the sum of the individual rankings for each trial. In this study, our aim was to expand upon our original finding and to explore whether a consensus judgement based upon a subjective discussion of each individual's judgements would be more or less successful than determining the consensus purely on the basis of a more objective summing of individual rankings.

To summarize, this study was a replication and extension of our previous study (Dalton et al., in press). This study was slightly different to the previous one in that there were two consensus judging methods (involving the judgements of two rather than three participants); the third participant was situated in a remote location; there were slightly fewer trials (28 vs. 32); there was a smaller target pool (72 vs. 100 clips); the timing schedule for the judging sessions was more variable.

The aim was to investigate whether dream (and also hypnagogic/hypnopompic imagery) clairvoyance might be possible. Further aims were to investigate whether individual versus small group consensus judging procedures and/or the emotionality of the dynamic target video clips would influence task performance.

Hypotheses for the Present Study

H_1 The direct hit rate for the discussion consensus judging method would be significantly higher than the mean chance expectation.

H_2 The direct hit rate for the negative emotion targets would be significantly higher than the mean chance expectation.

H_3 The direct hit rate for judgements attributed to hypnagogic or hypnopompic imagery would be significantly higher than the mean chance expectation.[4]

We also planned to explore whether (1) there would be a difference between the direct hit rates for two consensus judging procedures, i.e., discussion consensus and objective consensus; (2) the consensus direct hit rates would be higher than the individual's hit rates; (3) the direct hit rates would differ according to the emotionality of the target; (4) a participant who had obtained a significant direct hit rate in a previous dream ESP study (Dalton et al., in press) would be able to obtain similar results from a remote location.

METHOD

Design

This study used a clairvoyance design (i.e., no sender) although possible precognition could not be ruled out. Twenty-eight trials were prespecified as part of a repeated measures design. There was one pilot trial on the 4th September 1997. Two trials during the course of the study had to be aborted.[5] The pilot and the aborted trials were not included in the analysis. The experimental trials were carried out between 14th September and 13th December 1997.

[4]Note that in the end this hypothesis could not be tested due to the lack of hypnagogic/hypnopompic data collected.

[5]On the first occasion, the experimenter discovered that the computer program had not been able to complete its task of showing the target clip because both VCR's had been switched off. On the second occasion, an experimenter error meant that the computer program moved onto the judging sequence before the four possible video clips had been shown.

Typically, there were 2–3 trials per week, depending on the availability of the laboratory space and the participants.

The independent variables were (1) the judging procedure used (discussion consensus, objective consensus, individual) and (2) the emotionality of the target clips (positive, negative, neutral). There were two different participant locations, approximately 220 miles apart: Edinburgh, Scotland (SS, FS); Derby, England (KD).

The dependent variables were (1) the accuracy classification per trial (a direct hit or a miss), and (2) the dream-mentation-video-clip correspondence ranking (1–4) per trial.

Experimenters and Participants

Three of the authors (SS, KD, FS) acted both as experimenters and as participants. The fourth author (CW) collated and stored the remote participant's (KD) dream mentation and judgements and a copy of the computer printout for each trial. CW also checked the raw data and the statistical analyses.

All three participants typically report that they experience more than one dream per night on a regular basis. Typically, the participants reported 2–4 different dreams per night on trial nights.

Apparatus

The computer-controlled free-response testing system within the Koestler Parapsychology Unit (KPU) can be used under a variety of experimental designs. For more details of the equipment, the laboratory, and security measures, see, for example, Dalton et al. (in press), Dalton (1997b) or Dalton, Morris, Delanoy, Radin, Taylor, & Wiseman (1994).

Pseudo-Random Number Generator

Following recommendations for the reporting of randomisation methods (Milton & Wiseman, 1997), the target pool and the target clip within the selected pool for each trial were determined using a pseudo-random number generator (pseudo-RNG). The pseudo-RNG was a computer algorithm. The program used the RANDOMIZE TIMER command to generate a seed number for the random number function, RND. Initially, the computer program generated a random number to determine which of the 18 pools of clips would be used for the forthcoming trial; a second random number determined which of the four clips within the selected target pool would be the target clip. The computer program also utilised this procedure to determine the order of presentation of the video clips for the judging process.

Global tests of the randomness of the pseudo-RNG output generated by this method on the same equipment have been carried out in the past at periodic intervals and have not revealed any significant deviations from the expected distribution (Dalton, 1997b). Global tests of the random number output for selection of the target pool (1–18) and the target clip (1–4) were also carried out after the data for this study had been collected. A chi-square goodness of fit test (carried out on Microsoft Excel for Windows 95 version 7.0 using the CHITEST function) found that neither of these series deviated from the expected distribution to a significant extent.

Target Materials

This study used 18 separate target pools each containing four video clips taken from films, TV programmes, and cartoons. Thus, the target clip on any given trial was one out of a possible 72 video clips. Each video clip was one minute in duration and had an accompanying soundtrack. This set of target clips has been used in a previous sender/no sender ganzfeld study (Morris, Dalton, Delanoy, & Watt, 1995). The remote participant had a duplicate set of video clips that were viewed on her home VCR and television set.

One of the authors (KD) had previously had the 72 video clips viewed and categorised in terms of its emotionality (i.e. positive, negative, neutral) by three independent judges (see Dalton, 1997b). There were 24 positive, 26 negative, and 22 neutral video clips according to these three judges.

Procedure

Selection and Displaying of the Target Video Clip

Prior to each trial, the dream study computer program was set up by one of the Edinburgh experimenters; this required a password (known only to SS, FS or KD). The experimenters set up 14 trials each on a mostly alternate basis.

The computer created a file on the hard disk in which the details of the trial would be recorded. Note that this file could not be accessed by the experimenter without disrupting the experimental set-up. The experimenter was therefore blind as to which pool of target clips and which target clip had been selected for the forthcoming trial.

The randomly-selected target clip was later shown a total of 20 times between approximately 3.00–4.30 am on a television monitor and stereo headphones in a locked room.

Recording of Dream Mentation

During each trial night the participants slept at their respective homes and wrote down the contents of any dreams or hypnagogic or hypnopompic imagery that they could recall, either throughout the night or the following morning.

Judging Procedures

Edinburgh Participants. The following morning, the two participants (SS, FS) came into the KPU experimental suite with their hand-written dream mentation reports.

The name of each video clip in the selected target pool appeared on the computer monitor in turn and each clip was then displayed on the TV monitor.[6] Once the names and order of the four video clips were known, the experimenter telephoned the remote participant

[6]From trial 3 inclusive onwards, the television monitor remained switched off until after the order of the video clips in the target pool had been communicated to the remote participant. In trials 1 and 2, the TV monitor was switched on at the beginning which meant that the participants viewed each of the four clips before the order of clips had been communicated to the remote participant. The experimenters recognised the possibility that they might inadvertently communicate cues about the correspondence between clip contents and their own dream mentation during the telephone conversation with the remote participant and thus changed the procedure accordingly.

and communicated this information to her. The Edinburgh participants then watched each of the video clips in the computer-designated order while reviewing their dream mentation. Participants were allowed to view any or all of the clips again.

INDIVIDUAL JUDGING PROCEDURE. Each individual then gave a rating of 1–99 to each clip ('99' indicating a perfect correspondence) to indicate how closely each clip corresponded with their dream mentation. The clips were then placed in rank order, based on these ratings, with a rank of "1" being given to the clip with the highest correspondence to the dream mentation, "2" to the next highest correspondence and so on. Thus, the lower the rank assigned to the clip, the higher the correspondence with the dream mentation and the higher the expectation that it was the actual target. The participants then swapped their dream reports with each other (without having discussed or having mentioned their own dream mentation) and performed a similar rating and ranking procedure on each other's mentation. Note that participants' judgements of their own mentation were recorded separately so that they were blind as to the other participant's judgements at this stage. Participants were not permitted to go back and alter their own judgements.

DISCUSSION CONSENSUS JUDGING PROCEDURE. Having read and judged the correspondence between each other's dream mentation and the four video clips, the Edinburgh participants then discussed their mentations until they had reached a consensus regarding which clip they considered to be the target. This was known as the "discussion consensus" judging procedure.

OBJECTIVE CONSENSUS JUDGING PROCEDURE. Each individual's correspondence ratings and rankings were then collated and entered onto a record sheet (by SS) and checked by FS. The total sum of the ranks given to each individual clip (based on both participants' judgements of their own and each other's mentation) was calculated. The lowest sum of ranks was given a rank of "1", the next lowest a rank of "2" and so on. This was known as the "objective consensus" judging procedure. If there were any ties to the sums of ranks, the sum of the ratings was calculated for each tie and the highest sum of ratings was allocated the lower rank. If the sums of ratings tied, the range of ratings was calculated and the smaller range was given the lower rank. The objective consensus rankings were then entered into the computer. The individual ratings and rankings, the discussion consensus and the objective consensus rankings were recorded by hand on the record sheet.

Remote Participant. In the morning, the remote participant typed her dream mentation into an e-mail message which was sent to CW; this was carried out before KD was informed of the names of the clips for the trial. Once she had been informed of the names and the order of the video clips by the experimenter, the remote participant viewed each one in the designated order. The remote participant was free to watch each clip more than once if she wished to do so. She then followed the same individual rating and ranking procedure as the Edinburgh participants. Once the judging procedure had been completed, the remote participant entered her ratings and rankings into an e-mail that was then sent to CW. Thus, the remote participant kept a hand-written and a hard disk copy of her mentation, ratings and rankings.

Once the Edinburgh participants' objective consensus rankings had been entered into the computer, the experimenter telephoned the remote participant and checked that she had completed her judging and had e-mailed a copy of her mentation and judgements to CW.[7]

[7] Although the remote participant also verbally informed the experimenter of her rankings of the four clips prior to the target being revealed, this was not actually recorded by the experimenter.

The experimenter then instructed the computer to show which of the video clips had been the target, while on the phone to the remote participant, so that all three participants obtained feedback regarding their performance simultaneously.

Once the trial was completed, the experimenter instructed the computer to save the trial data to a floppy disk and also to print out three hard copies of the trial datafile that were stored in different locations. The remote participant's dream mentation and judgements were kept in the form of e-mail messages that were stored in CW's e-mail account. These e-mail messages were printed out as they came in.

Statistical Analysis

A table of raw data for the individual and consensus judging methods was produced from the experimental record sheets and the printouts of the remote participant's judgements by the first author (SS). SS also noted which experimenter had set up each trial, the name of the target clip and the emotionality of the target clip. This raw data table was checked against a similar table produced by KD. The trial by trial raw data records from the remote and the Edinburgh participants, the exact binomial probabilities, effect size calculations, sum of ranks analyses and global tests of randomness for the pseudo-RNG were double-checked by CW.

We have seen already how holistic judgements regarding which of the possible target alternatives most closely resembles a participant's mentation can involve interval (i.e., ratings), ordinal (ranking), or nominal (direct hit or miss) scoring (see Palmer, 1986b). Our study planned to analyse the direct hit rates, although, as noted later, we made a post hoc decision to also analyse the ordinal scoring.

Pre-planned Analyses

The critical ratio (CR) test, which is usually used to calculate the probability of gaining at least a given number of direct hits (assuming the null hypothesis is true), was not used as it is not recommended if *np* (number of trials $\times$ probability of a direct hit—where $p = .25$) is less than 10 (Palmer, 1986b, p. 148). Instead, the exact binomial probabilities for obtaining at least a given number of direct hits were calculated using the BINOMIST function of Microsoft Excel for Windows 95 version 7.0.

In terms of calculating the effect size, previous studies, including our own, have used Cohen's h (Cohen, 1977) to index the difference between two proportions (or hit rates). Calculations of Cohen's h and its 95% confidence limits were carried out by hand (by SS) using the formulae given by Rosenthal and Rosnow (1991, p. 449).

Post-hoc Analyses

A sum of ranks analysis might be a more sensitive measure of ESP performance than direct hits because it uses more information per trial (Milton, 1997). An inconclusive review of ganzfeld studies found that sums of ranks did outperform direct hits measures in terms of deviations from chance and effect sizes but not to a significant degree (Milton, 1997). A sum of ranks analysis was also carried out (Palmer, 1986b) in this study because it may facilitate further consideration of this issue.

The authors also decided to investigate a possible relationship between dream ESP performance and the earth's geomagnetic field (GMF) as they had done in a previous study (Dalton et al., in press). The reason for this analysis was that a number of recent studies have found that ESP (e.g., Berger & Persinger, 1991; Persinger, 1985) and dream ESP (Persinger & Krippner, 1989) seem to be more likely when the earth's geomagnetic field (GMF) is relatively low. Our previous study had found a small but non-significant relationship in the predicted direction ($r_s = 0.224$).

The daily average antipodal (Aa) index, which is the average change in global GMF from midnight to midnight on the day in question, was selected as the GMF index. A Spearman's rho correlation coefficient was calculated for the relationship between the GMF index and each of the objective-consensus and individual target rankings.

RESULTS

Group Versus Individual Judging Procedures

Table I shows that using the discussion consensus judging procedure, the Edinburgh participants scored 12 direct hits during the 28 trials (direct hit rate = .43 or 43% whereas mean chance expectation (MCE) = .25 or 25%). This is significantly higher than the mean chance expectation (exact binomial $p = .0294$ for ≥ 12 direct hits, ES(h) = 0.38, 95% C.I.(h) = 0.00–0.75). The objective consensus judging procedure yielded 11 direct hits during the 28 trials (direct hit rate = .39 or 39%) which is approaching a significant deviation from the mean chance expectation (exact binomial $p = .0679$ for ≥ 11 direct hits, ES(h) = 0.30, 95% C.I.(h) = −0.10–0.66). Thus, our hypothesis H_1 that the group would perform significantly better than the mean chance expectation using the discussion consensus judging procedure, was supported.

Table I also shows that the two Edinburgh participants both scored 7 direct hits during the 28 trials (direct hit rate = .25 or 25%, MCE = .25 or 25%) which is clearly not higher than chance expectations (exact binomial $p = .5721$ for ≥ 7 direct hits, ES(h) = 0.00, 95% C.I.(h) = −0.44–0.34). The remote participant scored higher than the Edinburgh participants and obtained 9 direct hits during the 28 trials (direct hit rate = .32 or 32%) which is also non-significant (exact binomial $p = .2499$ for ≥ 9 direct hits, ES(h) = 0.16, 95% C.I.(h) = −0.25–0.50).

The Edinburgh participants obtained a greater number of direct hits by using their group judgements than by using their own individual judgements. The discussion consensus

Table I. Number of Direct Hits and Distribution of Ranks Assigned to the Target Clips by the Edinburgh Participants (Both as a Group and as Individuals) and by the Remote Participant

	Correspondence rankings				Row total
	1	2	3	4	(sum of ranks)
Expected	7	7	7	7	28 (70)
Discussion consensus	12	—	—	—	—
Objective consensus	11	5	8	4	28 (61)
Edin. (SS)	7	13	4	4	28 (61)
Edin. (FS)	7	8	8	5	28 (67)
Remote	9	7	3	9	28 (68)

Note. A rank of 1 = a direct hit.

Table II. Number and Proportion of Direct Hits by Emotionality of the Target Clips and Individual Versus Consensus Judging Procedures

	Emotionality of the target clips			
	Positive	Negative	Neutral	Row total
Discussion consensus	6 (37.5%)	5 (62.5%)	1 (25.0%)	12
Objective consensus	5 (31.3%)	5 (62.5%)	1 (25.0%)	11
Edinburgh (SS)	4 (25.0%)	3 (37.5%)	0 (—)	7
Edinburgh (FS)	2 (12.5%)	5 (62.5%)	0 (—)	7
Remote (KD)	4 (25.0%)	4 (50.0%)	1 (25.0%)	9

procedure also yielded a marginally greater number of direct hits than the objective consensus procedure.

Post hoc sum of ranks analyses (Palmer, 1986b, p. 148) gave the following results: objective consensus ($CR(z) = 1.44$, $p = .0749$, one-tailed); Edinburgh participant (SS) ($CR(z) = 1.44$, $p = .0749$, one-tailed); Edinburgh participant (FS) ($CR(z) = 0.42$, $p = .3372$, one-tailed); remote participant (KD) ($CR(z) = 0.25$, $p = .4013$, one-tailed). These results show that, as with the nominal hit/miss scoring method, the objective consensus procedure yielded a result that was approaching a significant deviation from the chance expectation. Using the sum of ranks analysis, the Edinburgh participants' performance appeared to be slightly better than it did using the nominal scoring method; however, the remote participant's performance appeared to be slightly worse using the nominal scoring method. All individual performances were still non-significant using the sum of ranks analysis method.

Emotionality of the Target Clips

The majority of the target clips in the study were emotional, either positive (57.1%) or negative (28.6%). Table II shows that, both as a group and as individuals, participants obtained a greater proportion of direct hits when the target was negative than when it was either positive or neutral.[8] The direct hit rate for negative emotion targets was significantly higher than the mean chance expectation for both group judging methods and for one of the individuals (FS) (exact binomial $p = .0273$ for ≥ 5 direct hits, $ES(h) = 0.79$, 95% $C.I.(h) = 0.09–1.69$) which partially supports H_2. The direct hit-rates for the positive emotion targets were all non-significant.

Relationship with the Earth's Geomagnetic Field

The results of the post hoc analysis were non-significant and indicated that the correlations between the global Aa index and target rankings were as follows (all two-tailed): group objective consensus $r_s = -.327$, $p = .090$; Edinburgh participant (SS) $r_s = -.163$, $p = .407$; Edinburgh participant (FS) $r_s = -.013$, $p = .947$; remote participant (KD) $r_s = .075$, $p = .706$. Thus, the Edinburgh participants, both as a group and as individuals,

[8]We did not plan to test for significant differences between the hit rates for the positive, negative and neutral targets; it would not have been wise to do so given that the random selection process meant that the total number of each target type selected could not be guaranteed to be the same.

demonstrated a negative relationship between GMF and dream-ESP target rankings, i.e., as the Earth's geomagnetic field increased the dream-ESP performance increased. The remote participant demonstrated a small positive relationship. The relationships were all non-significant, although the relationship for the objective-consensus judging method was approaching significance.

DISCUSSION

Contrary to our previous study (Dalton et al., in press), the results of this dream ESP study found that only the group consensus judging procedures yielded a performance, in terms of number of direct hits, that was greater than chance expectations to a significant (discussion consensus, $p = .0294$, $\text{ES}(h) = 0.38$), or approaching significant (objective consensus, $p = .0679$, $\text{ES}(h) = 0.30$), extent. If ESP was operating in this study, the effect size was small; a value of $h = 0.20$ is considered to be a small effect, $h = 0.50$, a medium effect size (Rosenthal & Rosnow, 1991). The effect sizes for the group consensus judging methods were slightly smaller in this study (discussion $\text{ES}(h) = .38$, objective $\text{ES}(h) = .30$) than in the previous study ($\text{ES}(h) = .46$). However, this may in part be due to the fact that in this study the consensus judging procedure involved only two as opposed to three participants.

Further exploration of the data revealed that, as individuals, neither the Edinburgh participants nor the remote participant scored significantly higher than chance expectations in terms of the number of direct hits. In the previous study two of the participants scored significantly better than chance expectations ($p = .038$). The group consensus judgements obtained a greater number of direct hits than the individual judgements which is a replication of our previous findings (Dalton et al., in press). The discussion consensus judging procedure also obtained a marginally greater number of direct hits than the objective consensus judging procedure.

Both the individual and the consensus judgements obtained a greater number of direct hits when the targets were emotional as opposed to neutral; more specifically, performance was best when the targets were negative. Our previous study also found that the group performance was best when the targets were negative (Dalton et al., in press).

A post hoc sum of ranks analysis also found that the objective consensus and individual scores did not reach significance, although the probabilities of the Edinburgh participant scores were much closer to the criterion level for significance using this technique. This provides some support for previous research that has suggested that a sum of ranks analysis may be more sensitive and may yield greater deviations from chance and larger effect sizes (Milton, 1997).

Group Versus Individual Judging Procedures

This study provides some limited support for the occurrence of ESP during dreams but it seems that information received by more than one person was required in order to make judgements that were more accurate than chance expectations. However, in our previous study, two of the participants did score significantly better than chance expectations ($p = .038$, $\text{ES}(h) = 0.33$). The fact that we obtained a smaller effect size in this study using consensus judging methods with two rather than three participants may suggest that judging accuracy may increase as a function of the number of contributing judgements. Further exploration of this issue is warranted. Our finding that consensus judging procedures might be conducive to ESP, perhaps more so than individual procedures, supports previous findings for both dream ESP (e.g., Braud, 1977; Dalton et al., in press; Kanthamani et al., 1989; Kanthamani & Khilji, 1990) and waking ESP (e.g., Fiske & West, 1956, 1957; Kennedy, 1979).

As we had obtained significant results using a consensus judging procedure in our previous study, we had decided to compare two different consensus judging methods as part of this study. There did not appear to be much advantage to be gained by discussing possible target-mentation correspondences in order to reach a consensus as opposed to determining the consensus simply by pooling the independent individual judgements. While an objective consensus procedure could easily be used for either hit/miss or rank ordering scoring methods, the discussion consensus procedure takes much longer and is much more difficult.

So, why might group judgements be more successful than individual judgements? If ESP has a relatively weak effect then a combination of extrasensorially perceived information relating to the same target from more than one person may be required in order to boost the accuracy of target judgements to a significant level. However, looking at the success of a judging procedure that involves a single overall consensus call per trial, based on several individuals, is different from looking at the number of hits per trial based on the individual calls of several individuals per trial. In the latter case, the overall score may be partially due to a stacking effect. If more than one call is made per trial then the likelihood of a hit is increased because there is more than one chance of getting it correct. It must be recognised that our overall results may also have been partially biased by the stacking effect because we reported both individual and group performance, which are not independent.

Emotionality of the Target Clips

Participants tended to perform more successfully with emotional as opposed to neutral targets which supports some previous research (e.g., Bierman, 1995, 1997; Dalton et al., in press; Moss & Gingerelli, 1968; Radin, 1997; Williams & Duke, 1979) but not all. Other studies have suggested that neutral targets may be more conducive than emotional (Sondow et al., 1981).

The fact that participants tended to perform better with negative as opposed to positive targets supports our previous dream ESP study (Dalton et al., in press) but is in contrast to other findings from ganzfeld, presentiment and other ESP studies (Dalton, 1997b; Johnson, 1971; Radin, 1997; Williams & Duke, 1979). However, our findings regarding the emotionality of the target material should be treated with caution for the following reasons: (1) the comparison is based on a small number of trials, (2) the different types of target emotionality were not expected or observed to appear an equal number of times throughout the study because they were not counterbalanced across the target pools, (3) the emotionality categorizations were determined by a small number of independent judges—it is not known whether the participants' categorizations would have been in agreement,[9] (4) perhaps there

[9]There is some evidence that judges can agree on ratings of target content. As part of an exploration of the characteristics of free-response ESP target video clips, Delanoy and Solfvin (1996) found a high degree of inter-rater agreement on Pleasant–Unpleasant and Distressing–Relaxing dimensions. This was based on the ratings of 10 judges.

was a participant response bias towards selecting negative clips as being the target. As Delanoy (1988, p. 238) points out, there are likely to be some individual differences in what is considered to be positive, negative or neutral in terms of emotionality.

So, why might sleep, and also emotional target material, be conducive to dream ESP? In evolutionary terms, some organisms are likely to be at risk while they are asleep. It has been suggested that the periodical appearance of REM sleep and dreams provides a vigilance mechanism, which is oriented to the present and the future, and also an anticipatory arousal mechanism which counteracts these risks (Tolaas, 1986; Ullman, 1990). The dream vigilance mechanism would come into operation during each sleep cycle and would result in awakening, (if a potential threat was identified and was considered to be of sufficient importance) or a continuation of the sleep cycle and a return to non-REM sleep. There might be an ESP component within this mechanism which monitors information which is distant in terms of space and time (Ullman, 1986). It has further been suggested that, as society has developed, the dream vigilance mechanism has become focused on potential psychological rather than physical dangers and, in particular, to events which might disrupt connections with significant others (Ullman, 1986). Dreams might also attempt to address "areas of unresolved conflict" (Ullman et al., 1989, p. 175); more specifically, dream ESP might serve particular psychodynamic needs (Eisenbud, 1963a, cited by Rush, 1986, p. 64). The idea is that, by reviewing earlier (and possibly distant or future) events as part of a dream, the dreamer may identify events or information that were somehow related to the development of the conflict(s) or that might offer possible resolutions (Ullman et al., 1989). Evidence for this suggested explanation comes from the fact that a number of spontaneous cases of ESP, often involving dreams, have been reported by clients undergoing some form of psychotherapy (e.g., Ehrenwald, 1977a; Eisenbud, 1970; Ullman, 1959, 1975, all cited by Rush, 1986).

If these suggested explanations are correct, it would explain why many spontaneous cases of dream ESP feature emotionally-close persons and negative life events. It would also explain why negative target materials may be more conducive to dream ESP in the laboratory than positive or neutral materials.

Relationship With the Earth's Geomagnetic Field

The negative relationship between the GMF index and the group's objective-consensus target rankings ($r_s = -.353$) was in the opposite direction to the relationship obtained in a previous Edinburgh dream-ESP study ($r_s = .224$). The finding in this study is also contrary to previous research which has found that dream ESP is more likely when the Earth's geomagnetic field is lower (e.g., Persinger & Krippner, 1989).

However, recent research suggests that the relationship between GMF and free-response ESP performance may depend on the Local Sidereal Time (LST) at the time of the trials (Spottiswoode, 1997). As Spottiswoode (1997, p. 3) describes it, LST is "the longitudinal-like astronomical coordinate for the portion of the celestial sphere that is directly overhead at the time of the viewing." Spottiswoode (1997) found a large increase in the magnitude of the correlation between a GMF index and the anomalous cognition effect at approximately 13 hours LST. The correlation was found to be effectively zero outside of the 11.2–14.8 hours LST range. This LST factor may explain the discrepancy between this and our previous study. However, further analysis was not carried out because of the difficulty of determining the "psi window" i.e., the period during which the ESP was believed to be taking place. If ESP was operating, we do not know whether information about the identity of the target was obtained from the computer file or from the VCR or from the TV monitor that was showing the video clips; nor do we know exactly when any ESP might have been operating. It was felt that this imprecision and ambiguity would not allow any accurate or meaningful conclusions to be drawn from further analysis involving LST.

Another difficulty faced by parapsychologists is that of trying to establish the source of psi. Although the assumption is that any effect is caused by the participants, it is possible that any psi might be, to some extent, due to others, such as an experimenter effect (e.g., Kennedy & Taddonio, 1976; Palmer, 1997; Schmeidler, 1997, all cited by Irwin, 1999, p. 85).

Conclusion

This study was a fairly successful replication of our previous dream ESP study (Dalton et al., in press); consensus judging procedures and emotional (particularly negative) target video clips were associated with greater success in an ESP task. However, the effect sizes for the small group judging were slightly lower in this study (discussion $ES(h) = .38$, objective $ES(h) = .30$) than in the previous study ($ES(h) = .46$). While effect sizes for individual judgements were also much lower in this study, the group direct hit rates per emotional target type were of a similar magnitude. Possible reasons for these differences, apart from the procedural differences and the use of a different target pool, may be that in this study the schedule for the judging periods was more variable and involved earlier morning meetings (sometimes around 7 am) due to increased demands on the laboratory facilities. Another contributing feature may have been a lack of novelty or a change in the group dynamics. However, one of the positive aspects of this study, from the group participants' perspective at least, was that it maintained a relaxed and fairly informal atmosphere, features which have been found to be conducive in other small group dream ESP research (Ullman, 1989). It seems that home-based dream ESP research may continue to be a fruitful endeavour, particularly if it utilises emotional dynamic target material and consensus judging procedures.

ACKNOWLEDGMENT

We would like to acknowledge the Economic and Social Research Council (ESRC) for their financial support of Simon Sherwood, the Society for Psychical Research and the Institut fur Grenzgebiete der Psychologie und Psychohygiene for their support of Kathy Dalton, and Fundação Bial for their support of Fiona Steinkamp. Also, Drs. Jessica Utts and John Palmer for statistical advice. Also, thanks to Dr. Deborah Delanoy and the anonymous reviewers for helpful comments and Dr. James Spottiswoode for his advice regarding LST.

REFERENCES

Berger, R. E., & Persinger, M. A. (1991). Geophysical variables and behavior: LXVII. Quieter annual geomagnetic activity and larger effect size for experimental psi (ESP) studies over six decades. *Perceptual and Motor Skills, 73,* 1219–1223.

Bierman, D. J. (1995). The Amsterdam ganzfeld series III & IV: Target clip emotionality, effect sizes and openness. *Proceedings of the 38th Annual Convention of the Parapsychological Association*, Durham, NC, 27–37.

Bierman, D. J. (1997). Emotion and intuition I, II, III, IV & V: Unravelling variables contributing to the presentiment effect. *Proceedings of the 40th Annual Convention of the Parapsychological Association in conjunction with The Society for Psychical Research*, Brighton, UK, 49–62.

Braud, W. (1977). Long-distance dream and presleep telepathy. In J. D. Morris, W. G. Roll, & R. L. Morris (Eds.), *Research in Parapsychology 1976* (pp. 154–155) Metuchen, NJ: Scarecrow Press.

Carpenter, J. C. (1991). Prediction of forced-choice ESP performance part III: Three attempts to retrieve coded information using mood reports and a repeated-guessing technique. *Journal of Parapsychology, 55*, 227–280.

Carpenter, J. C. (1995). Small group interaction as a medium for ESP response. *Proceedings of the 38th Annual Convention of the Parapsychological Association*, Durham, NC, 79–87.

Child, I. L. (1985). Psychology and anomalous observations: The question of ESP in dreams. *American Psychologist, 40*, 1219–1230.

Child, I. L., Kanthamani, H., & Sweeney, V. M. (1977). A simplified experiment in dream telepathy. In J. D. Morris, W. G. Roll, & R. L. Morris (Eds.), *Research in Parapsychology 1976* (pp. 91–93). Metuchen, NJ: Scarecrow Press.

Cohen, J. (1977). *Statistical power analysis for the behavioral sciences* (rev. ed.). New York: Academic Press.

Dalton, K. (1997a). Is there a formula to success in the ganzfeld? Observations on predictors of psi-ganzfeld performance. *European Journal of Parapsychology, 13*, 71–82.

Dalton, K. (1997b). *The relationship between creativity and anomalous cognition in the ganzfeld*. Unpublished doctoral dissertation, Edinburgh University, Edinburgh, Scotland.

Dalton, K., Morris, R. L., Delanoy, D. L., Radin, D., Taylor, R., & Wiseman, R. (1994). Security measures in an automated ganzfeld system. *Proceedings of the 37th Annual Convention of the Parapsychological Association*, Amsterdam, Holland, 114–123.

Dalton, K., Steinkamp, F., & Sherwood, S. J. (in press). A dream GESP experiment using dynamic targets and consensus vote. *Journal of the American Society for Psychical Research*.

Dalton, K., & Utts, J. (1995). Sex pairings, target type, and geomagnetism in the PRL automated ganzfeld series. *Proceedings of the 38th Annual Convention of the Parapsychological Association*, Durham, NC, 99–112.

Delanoy, D. (1988). Characteristics of successful free-response targets: Experimental findings and observations. *Proceedings of the 31st Annual Convention of the Parapsychological Association*, Montreal, Quebec, 230–246.

Delanoy, D. L. (1989). Characteristics of successful free-response targets: Experimental findings and observations. In L. A. Henkel & R. E. Berger (Eds.), *Research in Parapsychology 1988* (pp. 92–95). Metuchen, NJ: Scarecrow Press.

Delanoy, D. L., & Solfvin, J. F. (1996). Exploring psychological variables of free-response ESP targets and their relationships to psi-scoring. *Proceedings of the 39th Annual Convention of the Parapsychological Association*, San Diego, CA, 1–17.

Gelade, G., & Harvie, R. (1975). Confidence ratings in an ESP task using affective stimuli. *Journal of the Society for Psychical Research, 48*, 209–219.

Gertz, J. (1983). Hypnagogic fantasy, EEG, and psi performance in a single subject. *Journal of the American Society for Psychical Research, 77*, 155–170.

Gurney, E., Myers, F. W. H., & Podmore, F. (1886). *Phantasms of the living*. London: Trübner, 2 vols.

Honorton, C., Berger, R., Varvoglis, M., Quant, M., Derr, P., Schechter, E., & Ferrari, D. (1990). Psi communication in the ganzfeld: Experiments with an automated testing system and a comparison with a meta-analysis of earlier studies. *Journal of Parapsychology, 54*, 99–139.

Irwin, H. J. (1999). *An introduction to parapsychology* (3rd ed.). Jefferson, NC: McFarland.

Johnson (1971). An attempt to effect scoring behavior in a group test of precognition by means of manipulation of motivation and by the use of individually assigned emotionally loaded target material. *Research Letter of the Parapsychological Division of the Psychological Laboratory*, University of Utrecht 15–32.

Kanthamani, H., & Broughton, R. S. (1992). An experiment in ganzfeld and dreams: A further confirmation. *Proceedings of the 35th Annual Convention of the Parapsychological Association*, Las Vegas, NV, 59–73.

Kanthamani, H., & Khilji, A. (1990). An experiment in ganzfeld and dreams: A confirmatory study. *Proceedings of the 33rd Annual Convention of the Parapsychological Association*, Chevy Chase, MD, 126–137.

Kanthamani, H., Khilji, A., & Rustomji-Kerns, R. (1989). An experiment in ganzfeld and dreams with a clairvoyance technique. In L. A. Henkel, & R. E. Berger (Eds.), *Research in Parapsychology 1988* (pp. 84–88). Metuchen, NJ: Scarecrow Press.

Krippner, S., & Zeichner, S. (1974). Descriptive analysis of art prints telepathically transmitted during sleep. In W. G. Roll, R. L. Morris, & J. D. Morris (Eds.), *Research in Parapsychology 1973* (pp. 27–28). Metuchen, NJ: Scarecrow Press.

Milton, J. (1997). An empirical comparison of the sensitivity of direct hits and sums of ranks as outcome measures for ganzfeld studies. *Proceedings of the 40^{th} Annual Convention of the Parapsychological Association in conjunction with the Society for Psychical Research,* Brighton, UK, 226–239.

Milton, J., & Wiseman, R. (1997). *Guidelines for extrasensory perception research.* Hatfield, England: University of Hertfordshire Press.

Morris, R. L., Dalton, K., Delanoy, D. L., & Watt, C. (1995). Comparison of the sender/no sender condition in the ganzfeld. *Proceedings of the 38^{th} Annual Convention of the Parapsychological Association,* Durham, NC, 244–259.

Palmer, J. (1986a). Experimental methods in ESP research. In H. L. Edge, R. L. Morris, J. Palmer, & J. H. Rush, *Foundations of parapsychology: Exploring the boundaries of human capacity* (pp. 111–137). London: Routledge & Kegan Paul.

Palmer, J. (1986b). Statistical methods in ESP research. In H. L. Edge, R. L. Morris, J. Palmer, & J. H. Rush, *Foundations of parapsychology: Exploring the boundaries of human capacity* (pp. 138–160). London: Routledge & Kegan Paul.

Persinger, M. A. (1985). Geophysical variables and behavior: XXX. Intense paranormal experiences occur during days of quiet, global, geomagnetic activity. *Perceptual and Motor Skills, 61,* 320–322.

Persinger, M. A., & Krippner, S. (1989). Dream ESP experiments and geomagnetic activity. *Journal of the American Society for Psychical Research, 83,* 101–116.

Radin, D. (1997). *The conscious universe: The scientific truth of psychic phenomena.* New York: Harper Collins.

Rosenthal, R., & Rosnow, R. L. (1991). *Essentials of behavioral research: Methods and data analysis.* (2nd ed.). New York: McGraw-Hill.

Rush, J. H. (1986). Spontaneous psi phenomena: case studies and field investigations. In H. L. Edge, R. L. Morris, J. Palmer, & J. H. Rush, *Foundations of parapsychology: Exploring the boundaries of human capacity* (pp. 47–69). London: Routledge & Kegan Paul.

Sondow, N., Braud, L., & Barker, P. (1981). Target qualities and affect measures in an exploratory psi ganzfeld. *Proceedings of the 24th Annual Convention of the Parapsychological Association.*

Spottiswoode, S. J. P. (1997). Geomagnetic fluctuations and free-response anomalous cognition: A new understanding. *Journal of Parapsychology, 61,* 3–12.

Tolaas, J. (1986). Vigilance theory and psi. Part I: Ethological and phylogenetic aspects. *Journal of the American Society for Psychical Research, 80,* 357–373.

Ullman, M. (1986). Vigilance theory and psi. Part II: Physiological, psychological, and parapsychological aspects. *Journal of the American Society for Psychical Research, 80,* 375–391.

Ullman, M. (1989). A group approach to the anomalous dream. In M. Ullman, S. Krippner with A. Vaughan, *Dream telepathy: Experiments in nocturnal ESP* (2nd ed.), (pp. 217–228). Jefferson, NC: McFarland.

Ullman, M., & Krippner, S., with Vaughan, A. (1989). *Dream telepathy: Experiments in nocturnal ESP* (2nd ed.). Jefferson, NC: McFarland.

Ullman, M. (1990). Dreams, species-connectedness, and the paranormal. *Journal of the American Society for Psychical Research, 84,* 105–125.

Van de Castle, R. L. (1971). The study of GESP in a group setting by means of dreams. *Journal of Parapsychology, 35,* 312.

Van de Castle, R. L. (1977). Sleep and dreams. In B. B. Wolman (Ed.), *Handbook of parapsychology* (pp. 473–499). Jefferson, NC: McFarland.

Watt, C. (1989). Characteristics of successful free-response targets: Theoretical considerations. In L. A. Henkel, & R. E. Berger (Eds.), *Research in Parapsychology 1988* (pp. 95–99). Metuchen, NJ: Scarecrow Press.

White, R. A., Krippner, S., Ullman, M., & Honorton, C. (1971). Experimentally-induced telepathic dreams with EEG-REM monitoring: Some manifest content variables related to psi operation. In W. G. Roll, R. L. Morris, & J. D. Morris (Eds.), *Proceedings of the Parapsychological Association, Number 5, 1968* (pp. 85–87). Durham, NC: Parapsychological Association.

Williams, L. B., & Duke, M. (1979). Qualities of free-response targets and their relationship to psi performance. *Proceedings of the 22nd Annual Convention of the Parapsychological Association.*

A Dream GESP Experiment Using Dynamic Targets and Consensus Vote

Kathy Dalton
Fiona Steinkamp
Simon J. Sherwood
University of Edinburgh, Scotland

ABSTRACT: This report presents a dream GESP experiment involving consensus vote within a group setting and dynamic video clips as target material. Three participants took part in a 32 trial dream-psi study using the automated free-response testing system at the University of Edinburgh. Target stimuli were randomly selected in groups of four from a pool of 100 video clips and the designated target for that trial shown at approximately 3am at the Koestler Chair Parapsychology Laboratory on trial nights. Each participant dreamed remotely at home and came to the laboratory the following morning for the judging sequence. A rank of 1 to the actual target was considered a 'direct hit', all other ranks were considered a 'miss'.

Study hypotheses were: 1) the direct hit rate for the group would significantly exceed MCE (.25); 2) the direct hit rate for individuals would significantly exceed MCE; 3) there would be a better overall direct hit rate for the group than for individuals, and; 4) there would be a positive correlation between low geomagnetic activity and ranking of the target for the group (i.e., as GMF increases, psi performance decreases).

Overall group hitting was significant with 15 direct hits for 32 trials, ($p = .006$, $ES(h) = .46$, (Cohen, 1977)). Two of the three participants also obtained independent significant scoring, both achieving 13 direct hits in 32 trials, which is significant for each at $p = .038$, $ES(h) = .33$. The third participant obtained 9 hits out of 32 trials, putting those results at close to chance, $p = .41$, $ES(h) = .07$. An analysis of the relationship (i.e. psi success and low geomagnetic activity) between the group's psi-dream target rankings and the global aa indices was in the predicted direction but not significant at rho = .224.

INTRODUCTION

Research into altered states has indicated that they may be conducive to psi (e.g., Braud, 1977; Honorton, 1977; Tart, 1969). There is extensive literature on two such altered states - the Ganzfeld and the dream state - and their inherent conduciveness for the reception and recognition of psi information (e.g., Honorton, 1992; Kanthamani, Khilji, and Rustomji-Kerns, 1989; Kanthamani and Khilji, 1990; Morris, Dalton, Delanoy & Watt, 1995; Morris, Cunningham, McAlpine & Taylor 1993; Schlitz & Honorton, 1992; Strauch, 1970). The Ganzfeld procedure is a form of sensory deprivation involving deep relaxation techniques and it is a direct offspring of the dream research conducted at Maimonides Dream Laboratory. Within parapsychology, the Ganzfeld technique is typically used to facilitate an inwardly directed altered state, similar to the dream state, and is currently used to facilitate the elicitation of psi in the laboratory. The dream state is typically associated with the activation of a built-in, biologically regulated mechanism that periodically, throughout the night, initiates a state of high cortical activation inducing the altered state experienced subjectively as dream consciousness. This state is accompanied by bursts of rapid conjugate eye movements (REM), and is believed to be the deepest state of sleep.

Anecdotal and clinical reports concerning psi in the dream state are numerous and have been reported throughout written history (e.g., Freud, 1953; Rhine, 1961). Of research conducted to test the occurrence of psi in dreams, the experimentally-based research conducted at the Maimonides Dream Laboratory stands out as some of the most successful and well known in parapsychology (Ullman & Krippner with Vaughan, 1973; 1989). This research attempted to elicit the acquisition of information by psi in dreams under carefully controlled laboratory conditions. An independent evaluation by Child (1985) of the Maimonides research yielded very high statistically significant results: the combined outcome of all series for both blind judges' and subjects' ratings was significant at $p = .001$(one-tailed).

The basic design of the Maimonides dream studies was to place an agent or sender in an acoustically isolated room. The sender would then attempt to transmit telepathically a randomly selected target picture (generally from a pool of either eight or twelve art prints) to a sleeping subject in another room. The subject's sleep was monitored by electroencephalograph (EEG) in order to gauge the best time to awaken them for dream reports. They would typically be awakened by the experimenter towards the end of a REM cycle and asked to report their dreams, which the experimenter recorded. These dreams were later transcribed for blind judging, with judges asked to review a range of targets and then assign ranks (with a 'one' usually designating a first place choice, etc.) according to how well the transcribed dreams matched each possible target material. Although the studies at Maimonides were mainly designated as experiments in telepathy, it is possible that the percipient may have been picking up on the target clairvoyantly, without the mediation of the agent's thoughts or efforts. Thus these studies might more appropriately be considered experiments in general ESP, or GESP. Because we are unable to rule out the possibility of either clairvoyance or precognition operating in the present study, we have used the term general extrasensory perception, or GESP, for this study.

Exact replications of the Maimonides dream-psi experiments were attempted at only two other dream laboratories - the University of Wyoming and the Boston School of Medicine. The two Wyoming experiments yielded results approximately at chance level - slightly below in one study (Belvedere & Foulkes, 1971), and slightly above in the other (Foulkes, Belvedere, Masters, Houston, Krippner, Honorton & Ullman, 1972). The Boston School of Medicine's attempt at replication produced results that, while not significantly positive, moved the researchers to state that "further conservatively designed research does seem indicated because of these findings" (Globus, Knapp, Skinner & Healy, 1968, p. 365).

Other replication attempts, conducted without the benefit of the facilities of a sleep laboratory, have reported results that encourage further exploration of the dream state as one conducive to the reception of psi information. Three studies conducted by Braud (1976) used slides developed at Maimonides for use in their dream research. Although Braud's first study - in which he himself acted as agent for 50 subjects - yielded suggestive but not significant results for the majority vote scores ($p < .06$, two-tailed), the majority of his subjects were people he did not know well. He then decided to limit the participant pool to people with whom he felt some connection. In the subsequent two studies, ten close friends took part with Braud again acting as agent. The combined results for the majority vote scores for these studies were highly significant at $p < .001$, two-tailed.

A study by Van de Castle (1971) involved the morning recall of dreams. Seventy members of a youth camp were percipients for a four night series, in which a member of staff acted as agent and the target material consisted of pools of five different colored magazine pictures. A different set of pictures was involved each night, and the campers individually viewed and ranked them the following morning. This study was quite successful, with overall significant results, $p < .002$ (one-tailed).

In a comparison of the Ganzfeld and the dream state using static targets, Kanthamani & Broughton (1993) reported above chance results for both states, but at a significant level for the dream state ($p < .005$, one-tailed). As altered states, the Ganzfeld and the dream state are similar in that they both make use of physical and mental relaxation, sensory isolation and inwardly directed attention. In addition, they are both concerned with 'free-response' subject material. It is possible that the use of dynamic targets in dream-psi research, such as video clips which more closely mimic real life material, rather than the use of static targets, such as art prints, may add to the ability of the participant to retrieve the target material.

These studies, and several others, offer encouraging evidence that incorporation of distant stimuli into dreams can be demonstrated under good experimental conditions. The possibility of dreams being used as a psi acquisition mechanism clearly merits careful attention from experimentalists who wish to explore this area but who are without recourse to the facilities of a formal dream laboratory. It was with these considerations in mind that the current study was devised.

DYNAMIC TARGETS

The majority of dream research in the past has made use of either art prints, (e.g., Child, Kanthamani & Sweeney, 1976; Foulkes et al., 1972), or of projector slides, often with accompanying sound (e.g., Braud, 1976; Krippner, Honorton, Ullman, Masters & Houston, 1971). One study by Hall (1967), cited by Van de Castle, employed miming by the sender. A study by Honorton, Ullman and Krippner (1975) involved a comparison of extrasensory and pre-sleep influences on dreams. Target stimuli were four brief films, two designated as emotional and two as neutral. Forty sender / receiver pairs, generally friends, were involved. On extrasensory nights, the sender would watch a film while the receiver was asleep and the receiver attempted to dream about the film. On the pre-sleep nights, the receivers themselves watched a film before falling asleep. Significant incorporation occurred on pre-sleep nights but not on the ESP nights. However, field independent subjects, as measured by the Frame and Rod Test and the Embedded Figures Test, obtained a significantly higher correspondence score in the ESP condition for the emotional films than for the neutral films ($P = .008$), but a similar difference was not found for these same subjects in the pre-sleep condition. Additionally, research in the Ganzfeld technique has indicated that dynamic targets, or video clips, may be the best type of target material for research into altered states and psi (Dalton & Utts, 1995; Honorton, Berger, Varvoglis, Quant, Derr, Schechter & Ferrari, 1990). This may be because video clips are closer to simulating real life. They involve color, sound, emotion and motion, and are typically thematically based, with this theme being reinforced throughout the duration of the video clip. Van de Castle (1977), himself a participant in several dream studies, strongly recommended that the target stimuli used in dream research be emotionally compelling and diversified. Based on the significant findings of current Ganzfeld work using dynamic targets (Bierman, 1995; Broughton & Alexander, 1995; Morris, Dalton, Delanoy & Watt, 1995), this study also made use of video clips as targets.

Consensus Vote

The majority vote technique used by Braud (1976) in his dream research, as well as the typical blind judging procedure employed by most dream studies, led us to speculate on the outcome of a consensus vote on any one night's dream material for the group. It was felt that if psi acquisition did occur in the dream state for all three participants, then a common theme, item, or pattern might emerge throughout the nights' dreams for all participants combined. A common theme that might otherwise be missed by the individual while ranking how well the targets corresponded with that persons' dreams might be picked by the group as a whole. The judging procedure used by Carpenter (1987) for reaching a consensus vote in a group setting was adapted as the basis of the judging procedure for this study.

Geomagnetic Influences

There has been increasing evidence over the last decade to suggest that there may be a relationship between fluctuations in the earth's geomagnetic field (GMF) and ESP. This relationship associates periods of relative quiescence in the GMF with enhanced psi perception (e.g., Arango & Persinger, 1988; Berger & Persinger, 1991; Dalton & Stevens, 1996; Persinger, 1985, 1987). As Persinger (1989) provides a sizeable review of this evidence, it will not be covered in depth here. For further discussion and debate on the same topic see Hubbard & May (1986) and Wilkinson & Gauld (1993).

Persinger and Krippner (1989) reported that higher scoring for dream ESP in the Maimonides experiments tended to occur on days of low GMF activity, relative to the surrounding days, as did Tart (1988) in his study of geomagnetic effects on GESP. Persinger and Krippner (1989) also found that when geomagnetic activity around the time of the strongest experimental telepathic dreams was compared to the geomagnetic activity around the time of the spontaneous telepathic dreams from the Gurney, Myers and Podmore (1886) collection, very similar (statistically indistinguishable) temporal patterns were observed. For the purposes of this study, it was decided to examine the state of the GMF during the 24-hour period in which the dream trial occurred. The daily average antipodal (aa) index was chosen as the GMF measure. The aa index provides a daily measure of the mean change in the global GMF and is one of the most frequently used to assess the ESP-GMF relationship. Geomagnetic indices were retrieved for each day on which a dream-psi session was conducted, from January 11 to March 16, 1996, after all sessions had been completed. The geomagnetic analysis was conducted specifically after all data was collected to avoid the possibility that knowledge of geomagnetic parameters during the experiment might bias experimenters' expectations of individual sessions.

HYPOTHESES

Based on our understanding of the previous dream-psi literature, we predicted that: 1) the direct hit rate for the group would significantly exceed mean chance expectation (MCE = .25); 2) that the direct hit rate for the individuals in the study would significantly exceed MCE; 3) that the overall direct hit rate would be better for the group than for the individuals involved (although given the small number of trials this effect would have to be very large to detect statistically); and, 4) that there would be a positive correlation between low GMF activity and psi hitting for the group. A rank of one assigned to the actual target would be considered a direct hit, all other ranks (2, 3, or 4) were considered misses. Study length was pre-specified at 32 trials, and all p values are one-tailed unless otherwise specified.

METHOD

The dream-psi study was conducted from January 11 to March 16, 1996. The three authors who served as the participants for this study are part of the Koestler Chair laboratory. Each reported having good dream recall and imagery, and a positive attitude toward GESP in the dream state. Strauch (1977) indicates that openness and willingness to share personal dream material in a safe environment is necessary to the success of dream-psi experimentation, and Van de Castle (1977) states that successful dream-psi percipients have generally been described as being 'open' or 'frank'. All three participants strove to maintain an open, yet confidential atmosphere amongst themselves throughout the dream study.

Participants dreamed remotely at home, writing their dreams down as they awoke spontaneously throughout the night or in the morning. The following morning they brought their hand-written dream records into the laboratory with them for comparison to the four target possibilities. Participants who did not consciously recall their dreams of the previous night were still asked to view and judge the target material on the premise that, as everyone dreams several times a night whether they remember it or not, they may still react subconsciously to the correct target material, even if that reaction was only a 'feeling' that one of the four possibilities was the correct target. Each participant chose one of three methods of obtaining the target material during their dream cycles: 1) Experimenter A chose 'Lucidity', in which the dreamer becomes aware that they are dreaming at some point during the dream. The participant would first attempt to become lucid and then during this lucid period would request, in the dream state, that they be shown the target information. 2) Experimenter B chose 'Conscious Volition', in which the participant, before falling asleep on even numbered trials, would consciously 'will' that night's trial to be a success for the group or, before falling asleep on odd numbered nights, would consciously 'will' that night's trial to be a success especially for that participant. 3) Experimenter C chose 'Waking After 'Target' Dream', in which the participant attempts to awaken during the night only after having the dream that contains the target material for that night's clip. Although the amount of recalled dream imagery varied from trial to trial and between individuals as well, participants overall averaged 3.4 dreams a night. Hereafter, participants will be referred to as experimenter A (Lucidity), experimenter B (Volition), or experimenter C (Waking).

EQUIPMENT

The free-response testing system at the University of Edinburgh is designed to be used under a variety of experimental designs. It is a computer based system that provides automatic data recording, highly effective shielding against sensory cues, and resistance to both subject and intentional experimenter bias. This automated free response testing system can easily be tailored to produce a variety of different experimental conditions, to explore those that work best in general, or best for specific participant populations. It can also vary conditions in accordance with the design of process-oriented studies and recently was used in a series of automated Ganzfeld research (Dalton, 1997, Morris et al., 1995). The program is run on a 33MHz 80386DX computer, equipped with a 210 MB fixed disk, 8 MB DRAM, four RS 232 serial ports, an 80387 numeric coprocessor, a super VGA monitor and a printer. The target presentation system involves two PC/VCRs, both frame-accurate NTSC videocassette recorders equipped with an RS 232 serial interface. The target pool consists of 100 different video clips, all exactly a minute long within a fraction of a second, and divided into 25 groups of four. For each trial in this study, one group of four clips was randomly chosen by the computer as the target pool for that trial, then one of the four clips was randomly chosen as the actual target for that trial, and each target selection took place with replacement. As this target pool is also currently being used in automated Ganzfeld research at the University of Edinburgh, the video tapes are never rewound to the beginning of the tape, but start up where the tape stopped at the end of the last session. In addition, an opaque cover, completely covered with black electrical tape, has been inserted inside the metal cover of the VCR itself, obscuring all digital information regarding tape characteristics. The target and judging video tapes are locked into the two separate VCRs via a specially designed metal housing unit, with a uniquely numbered brittle plastic security tab. This also renders the front control panels inaccessible, as these are completely enclosed by the metal housing unit for the VCRs. All VCR functions are controlled by computer software, and video, audio and computer graphics are routed to the appropriate rooms (experimenter, sender, or receiver), through computer control. The VCRs have been placed in a separate non-adjoining, sound attenuated room in the experimental suite. This room is accessed only through two back to back doors and video tape movement sounds cannot be heard outside of this room. Other equipment includes a NTSC video monitor and a stereo audio amplifier in the Target and Judging rooms. A layout of the rooms involved in this study is shown in Appendix 1.

The free-response program itself runs under a combination of Microsoft Quick Basic 4.5 and Windows 3.1/DOS 5, and is passworded - unless the experimenter has knowledge of the correct password he or she cannot run the program, and this password was known only to the three experimenters. The program produces a datafile during each session which is stored to both the hard drive and a floppy disk, and is sent for immediate printout to the printer at session conclusion. All target presentations, VCR video and audio signals, as well as computer graphics, are computer-controlled. For additional information on the security measures involved, as well as additional information on laboratory layout, see Dalton, Morris, Delanoy, Radin, Taylor & Wiseman (1994).

PROCEDURE

A simplified GESP design was used for this experiment in contrast to the telepathy design of the Maimonides research. As each experimenter also acted as participant in this study, it was decided to alternate who set up the computer program for each night's trial. Experimenters A and B set up the program eleven times each and experimenter C set up the program ten times. The following is an outline of the steps involved in setting up the computer program for each night's trial.

The experimenter for the trial would activate the dream study computer program to randomly select a one minute video clip to be played that night. The experimenter did not know which clip the computer had selected. The experimenter would then set the appropriate time for the one minute clip to be shown. This was predetermined to be for approximately 3am each trial. The experimenter would then enter the appropriate password and series number. The computer initiates a datafile for that session at this point. The experimenter is prompted by the computer to enter their initials and the trial number. At this point, the experimenter would also set the number of times the clip would be shown, pre-specified at 20, and how long to wait between showings of the clip, pre-specified for two minutes. In this way, the clip would be shown 20 times between the hours of 3am and 4am.

Next, the experimenter would verify that all appropriate levels and controls were in their default settings in case any trials from other studies that day had disrupted those settings. She/he would then go to the target room and turn on the TV monitor and stereo audio amplifier. The lights in the room were then turned off, the door to this room closed and locked for the duration of the trial, and the key returned to its secured location. Upon leaving for the night the experimenter also locked the door to the experimental suite.

The following morning, the three experimenters would come in with their hand-written dream records and meet in the experimental suite to proceed with the session judging. The judging procedure used by Carpenter (1987) for reaching a consensus vote in a group setting was used as the basis for the judging procedure in this study and went as follows: The experimenter for that trial would make sure that the monitor and sound was on in the judging room for the judging session. The other two participants would then enter and take seats, and the experimenter would signal the computer to begin the review of the four possible target choices. The four possible target clips were viewed by the participants, and participants were then given the opportunity to view any of the four again. Participants then individually judged each clip by assigning it a rank of 1 - 4 (1 representing the greatest degree of correspondence with dream imagery), and giving each possible clip a rating between 1 - 99 (first choice getting the highest rating). Ratings and ranks were hand noted by each participant on their dream report sheets, considered final for the individuals and not subject to change after the sharing aloud of dream material.

After each participant had written down their final ratings and ranks, each would share their night's dreams and report the rating and rank they had assigned to each clip, which the experimenter for that trial would write down on the session record sheet. The ranks for each clip were then added up and the clip with the lowest score given first place, the next lowest given second place, and so on. In the eventuality of ties, the ratings were added up and the clip with the highest rating was given the rank in question, with the lower rating taking the next rank. In the eventuality of a tie between ratings, the variance in ratings was taken into account. It was reasoned that a tighter variance would indicate a greater consensus on that target, and thus the clip with the lower variance received the lower of the remaining ranks. Group ranks and ratings were double checked by one of the other participants and then the experimenter for that trial entered the group data into the computer. As soon as this judging sequence was completed, the computer stored the group's experimental data both to disk and to hard drive and then revealed the target. Session data was then sent to the printer for multiple printout, and the experimenter was prompted to close out the session. It should be noted that no feedback regarding the target was given until the computer stored the judging data to disk. This disk was stored with the study file, and produced before each trial.

The automated free-response program records session data not only to the hard drive at the end of the session, but also to diskette throughout the session. Immediately after each session, as soon as the computer has recorded the session as completed, multiple copies of the session datafile were printed out for distribution to the appropriate parties. One session record went to a staff member of the Koestler Chair who was not involved with the study, one went to Experimenter C for independent storage and safe keeping, and one was included in the session file and placed in a filing cabinet in Experimenter A's office. The session records on computer disk were compared to printouts in the experimenters' possession and those of the Koestler Chair staff member for discrepancies before any data were analyzed. All three experimenters were required to sign the hand-written session record of target ratings and ranks for both the group and the individuals at the end of each session. This was then attached to the session printout along with the hand-written dream records and included in the study file with the computer print-out.

Results

The first hypothesis for this study - that the direct hit rate for the group would exceed MCE - was confirmed. There were 15 direct hits for the group in 32 trials, which is significant at p = .006, ES(h) = .46 (Cohen, 1977). (All p values are one-tailed unless otherwise specified). For completeness, the distribution of ranks for the group is shown in Table 1.

Table 1: Distribution of Ranks for Group

Rank	1	2	3	4
Obtained	15	11	4	2
Expected	8	8	8	8

The second hypothesis - that the direct hit rate for the individuals in the study would exceed MCE - was partially confirmed. Two of the three participants achieved hit rates that exceeded chance, both with 13 hits in 32 trials, which is significant at p = .038 for each, ES(h) = .33. One experimenter achieved 9 hits in 32 trials, which is close to chance, p = .41, ES(h) = .07. For completeness, the distribution of ranks by participant is shown in Table 2. It must be noted here that due to the possibility of a stacking effect these results cannot be considered to be independent of each other, or of the result in Hypothesis 1.

Table 2: Distribution of Ranks by Individual

Rank	1	2	3	4
Experimenter A	13	10	6	3
Experimenter B	9	12	5	6
Experimenter C	13	9	6	4
Expected	8	8	8	8

For the third hypothesis - that the overall direct hit rate would be better for the group than for the individuals involved – the evidence was in the correct direction. Given the small number of trials for this study this effect would have to have been very large for us to detect statistically, but the group obtained 15 hits out of 32 trials, while the averaged individual hit rate was 11.67 hits.

The fourth hypothesis - that there would be a positive correlation between low GMF and psi hitting for the group – while in the predicted direction, was not significantly supported. A nonparametric correlation (Spearman) was used to examine GMF aa values because it could not be assumed that these values were normally distributed. The relationship (i.e. group ranks and low global geomagnetic activity) between the group's psi-dream target rankings and the global aa indices was not significant, although in the predicted direction, at rho = .224.

EXAMPLES OF TARGET / MENTATION CORRESPONDENCES

In this section we present some examples of correspondences between targets and dream mentation. In each case we will give a description of the target first followed by the participant's dream report. While conclusions cannot be drawn from qualitative data, it does constitute the raw material upon which the objective statistical data is based and may provide important insights concerning the underlying process. These examples are excerpts from the dream reports of the participants, identified by them as providing the basis for rating the target first. We have edited these sections for purpose of illustration in this paper. They are not submitted for any evidential value.

Target 91, Early Man. From the film *2001.* This clip depicts a group of man-like ape creatures, who awaken in a sheltered rocky overhang to find an obelisk in their midst. The obelisk begins making a loud high-pitched noise and the ape-men become frightened. They begin frenzied jumping around, making threatening moves towards and away from the obelisk.

Trial #4, Experimenter A, Rank 1. "Dreamt of people trying to hide from other people. This seemed to be mixed up with people having very short, very fine fur, and I seemed to keep hearing someone saying 'people have skin, not fur'. I kept thinking of monkeys."

Target 88, Beast. From the film *Legend.* This clip shows a red skinned man with horns, black lips, fangs and cats eyes stepping out of a mirror. He speaks mockingly about dreams and love, and in the closing scene he grins and then laughs wickedly.

Trial #6, Experimenter B, Rank 1. "Dreamt of a man with a severely burnt or maimed face. There was a close up of his lips as he tried to speak. His mouth seemed normal, but there was a green spot on his lip. This made him seem like an alien."

Target 71, Space Ships. From the film *Star Wars.* This clip is a compilation of scenes throughout the Star Wars movie showing various types of spacecraft flying and manoeuvring, some near large planets or through 'warp holes'.

Trial #5, Experimenter C, Rank 1. "Saw a saucer-shaped, silver metallic UFO fly over me, bank over some trees and then fly back over me."

DISCUSSION

The significant success rate (47%, p = .006) of the group in correctly selecting the target replicates the success of the Maimonides dream studies, albeit without the benefit of the facilities of a formal dream laboratory. This is in keeping with several small scale studies done without the use of extensive sleep laboratories that supported the more convincing Maimonides work (Child, 1985). The indication of a slightly higher level of success for the group as compared to the individual may indicate that dream-psi may often occur at such a low level that it is missed by the individual, whereas a sharing of dream mentation within a group setting allows for the manifestation of common themes, patterns, or items. This leads us to recommend the continued exploration of consensus vote in the judging sequence of dream research.

However, we must speculate on the nature of why group judgements might be more successful than individual judgements. If ESP is a relatively weak effect then a combination of extrasensorially perceived information relating to the same target from more than one person may be required in order to boost the accuracy of target judgements to a significant level. However, looking at the success of a judging procedure which involves a single overall consensus call per trial, based on the consensus of several individuals, is different from looking at the number of hits per trial based on the individual calls of several participants per trial. In the latter case, the overall score may be partially due to a stacking effect. In this respect, our overall results may also have been partially biased by the stacking effect since we reported both individual and group performance which are not independent.

Contrary to previous literature, our expectation of significant psi hitting during times of low GMF was not supported (rho. = .224). However, it was in the predicted direction and we plan to continue to explore this particular variable in future dream studies. The significant success rate for two of the participants ($p = .038$ each) in this study continues to point to the richness of the dream state as a vehicle for enhancing psi acquisition for the individual. The different methods chosen as an approach to facilitating dream-psi success by each individual met with varying degrees of success, and some speculation is called for on why this might be so.

Lucidity, in which the dreamer becomes aware that they are dreaming at some point during the dream, was the approach chosen by experimenter A in order to facilitate the acquisition of target information in the dream state. The participant would first attempt to become lucid, by means of a pre-sleep suggestion, and after having achieved the lucid state, the participant would then request while in the dream state that they be shown the target information. This approach is considered to have worked fairly well, with experimenter A having three lucid dreams during the course of the study, and correctly choosing the target twice due to the information received in these dreams. In one such dream, upon becoming lucid the experimenter stepped through a door into a sunny parking lot in which a group of tough-looking teenage boys were hanging out, all wearing sunglasses. The dream target for the following day involved a helicopter chase scene with James Bond in which all of the 'bad guys' wore sunglasses against the glare of the sun. Additionally, experimenter B also experienced a lucid dream during the course of the study. Upon asking to be shown the target material, the experimenter began flying uncontrollably around the room, twisting and turning. The following day, experimenter B correctly chose the clip 'Flying Nannies', depicting a scene from ‘Mary Poppins’ which focuses on the other nannies getting blown away by a high wind, twisting and turning uncontrollably, as Mary Poppins arrives to take the post. Therefore, for an overall total of four lucid dreams during the study, three of them contained highly accurate target material. This approach was considered to be a success, if somewhat limited by the ability of the dreamer to become lucid at will.

Experimenter B chose the approach of 'conscious volition' in order to facilitate the acquisition of psi information in the dream state. In order to assist both the group and their self in succeeding in the goal of scoring above MCE for the study, experimenter B decided to alternate the conscious aim for each trial. Thus, on odd numbered trials experimenter B consciously willed, before going to sleep, to dream about the target during the night and to successfully guess the right target in the morning. On even numbered trials experimenter B consciously willed for the *group* to dream successfully about the target and for the *group* to select the target correctly the following day. Experimenter B felt that wishing for the group's success would also enable experimenter B to do well on those trials, as it would involve both a release of pressure to succeed and less ego involvement. However, experimenter B's personal results were at chance level, as were the differences between willing for self and willing for group. Table 3 shows that both group and individual did marginally, but not significantly, better on trials for which experimenter B had willed the group to succeed. It is felt that due to the low number of trials no conclusions can be drawn about this method. Also, when viewing these results it should be kept in mind that the analyses presented here and in the following pages are post hoc, and not adjusted for multiple analyses.

Table 3: Results of Conscious Willing for Group or for Self

	Group Hits	Individual's Hits
Hoping for Self	6	4
Hoping for Group	9	5

Experimenter C chose a 'waking after the target dream' approach, which also involved self-suggestion prior to sleep onset, but in a process-oriented manner. The experimenter silently repeated the following suggestion two to three times immediately prior to sleep:

When I fall asleep tonight I will dream and my dreams will relate to the target imagery. I will wake up after the dream which relates to the target and I will recall the contents of this dream.

There is some evidence, often anecdotal, that some individuals can employ strategies which enable them to awaken at a pre-selected time. Empson (1993) cites a study which found that individuals who claimed to be able to awaken at pre-selected times were able to achieve this with considerable accuracy. It was hoped that this pre-sleep suggestion might be able to achieve awakening at the desired time. This strategy seems to have had some success: on eight of the thirteen nights on which experimenter C got an individual hit, they (experimenter C) also awoke during the night and recalled aspects of a target related dream. However, on one occasion experimenter C achieved a hit despite not awakening during the night and not recalling the contents of any dreams. An expansion of this strategy might involve a more specific suggestion, or physically awakening the sleeper via an alarm either during or after the time period when the target clip is being shown.

Due to unforeseen time constraints a decision was made, during the course of the study, to compare informally whether the spacing between dream trials would have any effect upon the acquisition of psi in the dream state for the three participants. Thus, the first 16 trials of the study were compared to the last sixteen trials as a transition in the spacing of the trial nights occurred then. The first sixteen trials involved having only two, or at most three, dream trials in a single week. The second sixteen trials of the study involved having five, or at most six, dream trials in a single week. Statistically, this did not seem to impact the group's ability to select the target correctly, with 8 direct hits in the first 16 trials and 7 direct hits in the last 16 trials. However, as can be seen from Table 4, it did have an impact on the individual responses, with experimenter A's hit rate dropping slightly, experimenter B's hit rate improving slightly, and the largest impact occurring for experimenter C, whose direct hit rate dropped from 10 in the first 16 trials to 3 in the last 16 trials. Additionally, the group experienced three of the seven hits for the last 16 trials in the last three trials of the study. The pattern of hits and misses for the last 16 trials reveals a terminal salience effect often found in other psi research (Rhine, 1941).

Table 4: Comparison of Hit Rate for First 16 Trials to Second 16 Trials

	First 16 Trials Number of Hits	Second 16 Trials Number of Hits
Group	8	7
Experimenter A	8	5
Experimenter B	4	5
Experimenter C	10	3

During the course of the study, the authors felt it may be possible they were picking up better on targets containing a threatening aspect, or conveying a negative impact. Some researchers have suggested that a certain amount of vigilance takes place in the dream state (Tolaas, 1986; Ullman, 1986, 1990), a continued unconscious scanning of our environment in order to monitor any possible threats, physical or psychological, to our well-being. Ganzfeld studies exploring the impact of the emotionality of the target stimuli (Bierman, 1995) seem to indicate that video clips with either a high negative or positive content are better target material, and Krippner (1975) suggested that emotional stimuli are more effective in dreams than in non-dream experiments. Three independent blind judges rated the emotional impact of each of the 100 targets in the dream study pool by assigning either a positive impact, a negative impact or as being neutral. This evaluation revealed a total of 35 emotionally positive targets, 32 emotionally negative and 33 emotionally neutral targets comprising the study pool. The total number of direct hits in the study was 15 in 32 trials. When these fifteen targets are broken down into their emotionality categories we see the percentage of each category in this study (Table 5).

Table 5: Percentage of Hits by Target Type (Total hits = 15)

	Positive Targets	Negative Targets	Neutral Targets
Hits	4	8	3
% of Total Hits	4 / 15 = 26.6%	8 / 15 = 53.3%	3 / 15 = 20%

This table shows that in fact the majority of hits were on negative targets - but was this due to a preponderance of negative targets within the target pool itself? To answer this question we looked at how often a particular type of target was chosen in terms of its availability within the target pool of 100, i.e., there were 35 positive clips available for selection as targets within the pool of 100, 32 negative clips available for selection as targets, and so on (see Table 6).

Table 6: Target Type Availability Within Pool

	Positive Targets	Negative Targets	Neutral Targets
Target Type Availability	35	32	33
Times Selected As Target	9	13	10
% of Category	25.7%	40.6%	30.3%
Direct Hit	4	8	3
% of Direct Hits	4 / 9 = 44%	8 / 13 = 61%	3 / 10 = 30%

Table 6 shows that almost 41% of the targets selected by the computer for the study contained a negative or threatening aspect. But, were the experimenters actually picking up better on these types of targets? Table 6 also shows both the number of times a target from each category was selected by the computer as the target, and the number of times it was correctly chosen by the group as the target. The percentage of times each target was correctly chosen is also shown.

As can be seen from the last two rows in Table 6, the experimenters seemed to be quite successful in getting 8 direct hits out of the 13 times a negative clip was the actual target, for a 61% hit rate, $p = .006$. This is followed by the positive targets with 4 direct hits out of 9 presentations (hit rate 44%, $p = .16$), with the neutral targets having the poorest response rate of 3 hits in 10 presentations (30%, p = .47). These tables support both the feelings of the researchers in that they were picking up better on targets having a negative or threatening aspect, as well as the previous literature on emotional stimuli and vigilance in the dream state.

Based upon interest expressed at the initial presentation of this paper, a sum of ranks (SOR) analyses has been performed to allow the results from this study to be more easily compared to other similar work. This analysis yielded SOR = 57, z = 3.58, ES = .63. This is similar to the types of effect size that has been seen in remote viewing work (May, Utts, Humphrey, Luke, Frivold and Trask, 1990; May, Spottiswoode & James, 1994), and there has been some speculation as to whether the richness of the dream state might be comparable to the task of remote viewing in one's sleep.

While the consensus vote technique seemed to work fairly well for us as a group, there were some concerns over the possibility that participants may have picked up verbal or non-verbal cues during the viewing period as to possible correspondences in other participants dreams. This may have lead to a conscious or unconscious influence in subsequent ratings. Also, on sharing the dream material it sometimes appeared as if there were a recurrent theme in each of them. This led us to speculate whether it would have been better to confer as a group on the judging, rather than statistically, which target we wished to select as a group choice. However, it was decided that this type of approach may be a difficult strategy to employ due to either personality characteristics or personal convictions (concerning the correct target) adversely affecting a fair vote.

The level of success in this study would seem to indicate that conducting dream-psi research in the privacy of the participant's home is a viable proposition. Participants who may view the confines of the laboratory as restrictive or the social setting of the laboratory uncomfortable, might find the idea of participating in a formal psi experiment from the comfort of their own home very appealing. Robinson (1982) has detailed the importance of participants having choices in how they participate in psi experimentation and has also summarized the psychological literature on choice and perceived control. This literature shows that if participants feel (perceive) that they have control when performing different types of tasks, their performance will improve. Dream research conducted with participants dreaming at home could allow them to select the best night for their participation, their approach to acquisition of the dream-psi material, to decide how that material is revealed to the experimenter, and even to determine the time of day that they wish to come into the laboratory for the judging session. This type of research, conducted with the participant operating from the comfort and security of their own home (Delanoy, Watt, Morris & Wiseman, 1993), reduces the expense of dream-psi research, eliminating the need for expensive laboratory sleep monitoring equipment. Additionally, in many cases the time involved for the experimenter is greatly reduced. The orientation time for a dream study is minimal, and questionnaires or forms can be filled out at home and returned upon arrival for the judging session. The judging session itself takes minimal time, with the judging process for the three experimenters in this study taking approximately 30 to 45 minutes per session. This may conceivably be less with a single participant.

Although this study was relatively small, with only three participants taking part in 32 trials, the overall significant scoring was very encouraging and seems to suggest that dream research, conducted without the use of laboratory sleep monitoring equipment, remains a vital and worthwhile area of investigation. In this study the target was selected by the computer at time of the initiation of the VCRs but not actually shown until later in the night. Thus, if one dreamt about the target clip at 1am but the target clip was not shown until 3am, this makes it impossible to rule out clairvoyance over precognition, since the target clip has already been determined. A future study could involve selection of the target immediately prior to playback, enabling a clearer distinction between precognitive and clairvoyant dreams. Additionally, where possible a telepathic design should be considered, as the use of a sender may engender a feeling of more personal psi interactions for the participant and may result in higher scoring rates, or a clearer manifestation of dream-psi imagery. This appears particularly so with the use of dynamic targets, which more closely mimic real life situations. It is hoped that future dream-psi studies conducted by other researchers will make use of dynamic targets, with participation taking place outside the confines of the laboratory, in order to replicate the results presented here. It is our feeling that dream research continues to be a promising technique for experimental study of the ESP question.

References

Arango, M. A. and Persinger, M. A. (1988). Geophysical variables and behaviour: LII. Decreased geomagnetic activity and spontaneous telepathic experiences from the Sidgwick collection. *Perceptual and Motor Skills*, **67** (3), 907 - 910.

Belvedere, E., and Foulkes, D. (1971). Telepathy and dreams: A failure to replicate. *Perceptual and Motor Skills*, **33**, 783 - 789.

Berger, R. E. and Persinger, M. A. (1991). Geophysical variables and behaviour: LXVII. Quieter annual geomagnetic activity and larger effect size for experimental psi (ESP) studies over six decades. *Perceptual and Motor Skills*, **73** (3), 1219 - 1223.

Bierman, D. J. (1995). The Amsterdam Ganzfeld series III & IV: Target clip emotionality, effect sizes and openness. *Proceedings of the Parapsychological Association 38th Annual Convention,* Durham, North Carolina, 27 - 37.

Braud, W. (1976). Long-distance dream and presleep telepathy. In J.D. Morris, W.G. Roll, & R.L. Morris (Eds.), *Research in Parapsychology 1976*, 154 - 155. Metuchen, N.J.: Scarecrow Press.

Braud, W. (1977). Psi conducive conditions: Explorations and interpretations. In B. Shapin and L. Coly (Eds.), *Psi and States of Awareness*, 221 - 237. New York: Parapsychology Foundation.

Broughton, R. S. and Alexander, C. H. (1995). AutoGanzfeld II: The first 100 sessions. *Proceedings of the Parapsychological Association 38th Annual Convention,* Durham, North Carolina, 53 - 61.

Carpenter, J. C. (1987). Exploration of a quasi-therapeutic process as a vehicle for facilitating psi. *Proceedings of the Parapsychological Association 30th Annual Convention,* Edinburgh, Scotland, 297 - 308.

Child, I. L. (1985). Psychology and anomalous observations: The question of ESP in dreams. *American Psychologist*, **40**, 1219 - 1230.

Child, I. L., Kanthamani, H., and Sweeney, V. M. (1976). A simplified experiment in dream telepathy. In J.D. Morris, W.G. Roll, & R.L. Morris (Eds.), *Research in Parapsychology 1976*, 91 - 93. Metuchen, NJ: Scarecrow Press.

Cohen, J. (1977). *Statistical Power Analysis for the Behavioral Sciences* (Rev. Ed.). New York: Academic Press.

Dalton, K. and Stevens, P. (1996). Geomagnetism and the Edinburgh automated Ganzfeld. *European Journal of Parapsychology*, **12**, 23 - 34.

Dalton, K., Morris, R. L., Delanoy, D. L., Radin, D., Taylor, R. and Wiseman, R. (1996). Security measures in an automated Ganzfeld system. *Journal of Parapsychology*, **60**, 129 - 147.

Dalton, K. and Utts, J. (1995). Sex pairings, target type, and geomagnetism in the PRL automated Ganzfeld series. *Proceedings of the Parapsychological Association 38th Annual Convention,* Durham, North Carolina, 99 - 112.

Delanoy, D. L., Watt, C. A., Morris, R. L., and Wiseman, R. (1993). A new methodology for free-response ESP testing outwith the laboratory: Findings from experienced participants. *Proceedings of the Parapsychological Association 36th Annual Convention,* Toronto, Canada, 204 - 221.

Empson, J. (1993). *Sleep and Dreaming.* (2nd revised ed.). Hemel Hempstead: Harvester Wheatsheaf.

Foulkes, D., Belvedere, E., Masters, R., Houston, J., Krippner, S., Honorton, C., and Ullman, M. (1972). Long distance, "sensory bombardment" ESP in dreams: A failure to replicate. *Perceptual and Motor Skills*, **35**, 731 - 734.

Freud, S. (1953). Dreams and telepathy. In Devereux, G. (Ed.), *Psychoanalysis and the Occult*. New York: International Universities Press, 1953, 58 - 60.

Globus, G. G., Knapp, P. H., Skinner, J. C., and Healy, G. (1968). An appraisal of telepathic communication in dreams. *Psychophysiology*, **4**, 365.

Gurney, E., Myers, F. W. H., and Podmore, F. (1886). *Phantasms of the Living.* London: Trubner, 2 vols.

Honorton, C. (1992). The Ganzfeld novice: Four predictors of initial ESP performance. *Proceedings of the Parapsychological Association 35th Annual Convention*, Las Vegas, Nevada, 51 - 58.

Honorton, C., Berger, R., Varvoglis, M., Quant, M., Derr, P., Schechter, E., and Ferrari, D. (1990). Psi communication in the Ganzfeld: Experiments with an automated testing system and a comparison with a meta-analysis of earlier studies. *Journal of Parapsychology*, **54**, 99 - 139.

Honorton, C. (1977). Psi and internal attention states. In B. Wolman (Ed.) *Handbook of Parapsychology*, 435 - 472. Jefferson, North Carolina: McFarland and Company, Inc.

Hubbard, G. S. and May, E. C. (1986). Aspects of the measurement and application of geomagnetic indices and extremely low frequency electromagnetic radiation for use in parapsychology. In D. H. Weiner & R. D. Nelson (Eds.), *Research in Parapsychology 1986*, Metuchen, NJ: Scarecrow Press, 79 - 82.

Kanthamani, H. and Broughton, R. S. (1993). An experiment in Ganzfeld and dreams: A further confirmation. *Proceedings of the Parapsychological Association 35th Annual Convention*, Las Vegas, Nevada, 59 - 73.

Kanthamani, H. and Khilji, A. (1990). An experiment in Ganzfeld and dreams: A confirmatory study. *Proceedings of the Parapsychological Association 33rd Annual Convention*, Chevy Chase, MD, 126 - 137.

Kanthamani, H. and Khilji, A. and Rustomji-Kerns, R. (1989). An experiment in Ganzfeld and dreams with a clairvoyance technique. In L. A. Henkel & R. E. Berger (Eds.), *Research in Parapsychology 1988*, Metuchen, NJ: Scarecrow Press, 84 - 88.

Krippner, S. (1975). Dreams and other altered conscious states. *Journal of Communication*, **25**, 173 - 182.

Krippner, S., Honorton, C., Ullman, M., Masters, R., and Houston, J. (1971). A long-distance "sensory-bombardment" study of ESP in dreams. *Journal of the American Society for Psychical Research*, **65**, 468 - 475.

May, E. C., Spottiswoode, J. P., and James, C. L. (1994). Managing the target pool bandwidth: Noise reduction for anomalous cognition experiments. *Proceedings of the Parapsychological Association 37th Annual Convention*, Amsterdam, Holland, 253 - 260.

May, E. C., Utts, J. M., Humphrey, B. S., Luke, W. L. W., Frivold, T. J., and Trask, V. V. (1990). Advances in remote-viewing analysis. *Journal of Parapsychology*, **54**, 193 - 228.

Morris, R. L., Dalton, K., Delanoy, D. L., and Watt, C. A. (1995). Comparison of the sender / no sender condition in the Ganzfeld. *Proceedings of the Parapsychological Association 38th Annual Convention,* Durham, North Carolina, 244 - 259.

Morris, R. L., Cunningham, S., McAlpine, S. and Taylor, R. (1993). Toward replication and extension of autoGanzfeld results. *Proceedings of the Parapsychological Association 36th Annual Convention,* Toronto, Canada, 177 - 191.

Persinger, M. A. (1985). Geophysical variables and behaviour: XXX. Intense paranormal experiences occur during days of quiet, global, geomagnetic activity. *Perceptual and Motor Skills*, **61**, 320 – 322.

Persinger, M. A. (1987). Spontaneous telepathic experiences from Phantasms of the Living and low global geomagnetic activity. *Journal of the American Society for Psychical Research*, **81**, 23 - 36.

Persinger, M. A. (1989). Psi phenomena and temporal lobe activity: The geomagnetic factor. In L. A. Henkel & R. E. Berger (Eds.), *Research in Parapsychology 1988*, Metuchen, NJ: Scarecrow Press, 121 - 156.

Persinger, M. A. and Krippner, S. (1989). Dream ESP experiences and geomagnetic activity. *Journal of the American Society for Psychical Research*, **83**, 101 - 116.

Rhine, L. E. (1961). *Hidden Channels of the Mind.* New York: William Sloan Associates, 1961.

Rhine, J. B. (1941). Terminal salience in ESP performance. *Journal of Parapsychology*, **5**, 183 - 244.

Robinson, D. (1982). Motivation in parapsychology: Competence, control and the choice effect. In W. G. Roll, R. L. Morris & R. A. White (Eds.), *Research in Parapsychology 1981*, Metuchen, N.J.: Scarecrow Press, 103 - 106.

Schlitz, M. J. and Honorton, C. (1992). Ganzfeld psi performance within an artistically gifted population. *Journal of the American Society for Psychical Research*, **86**, 93 - 98.

Strauch, I. (1977). The case of telepathy as revealed in sleep research findings. In B. Shapin and L. Coly (Eds.), *Psi and States of Awareness*, 221 - 237. New York: Parapsychology Foundation.

Strauch, I. (1970). Dreams and psi in the laboratory. In R. Cavenna (Ed.) *Psi Favorable States of Consciousness*, 46 - 54. New York: Parapsychology Foundation.

Tart, C. T. (1988). Geomagnetic effects on GESP: Two studies. *Journal of the American Society for Psychical Research*, **82**, 193 - 215.

Tart, C. T. (1969). *Altered States of Consciousness*. Tart, C. T. (Ed.). John Wiley & Sons, Inc.

Tolaas, J. (1986). Vigilance theory and psi, part I: Ethological and phylogenetic aspects. *Journal of the American Society for Psychical Research*, **80**, 357 - 373.

Ullman, M. and Krippner, S., with Vaughan, A. (1973). *Dream Telepathy*. New York: Macmillan.

Ullman, M. and Krippner, S., with Vaughan, A. (1989). *Dream Telepathy*: Second Edition. Jefferson, N.C.: McFarland.

Ullman, M. (1986). Vigilance theory and psi, part II: Physiological, psychological, and parapsychological aspects. *Journal of the American Society for Psychical Research*, **80**, 376 - 391.

Ullman, M. (1990). Dreams, species-connectedness, and the paranormal. *Journal of the American Society for Psychical Research*, **84**, 105 - 125.

Van de Castle, R. L. (1971). The study of GESP in a group setting by means of dreams. *Journal of Parapsychology*, **35**, 312.

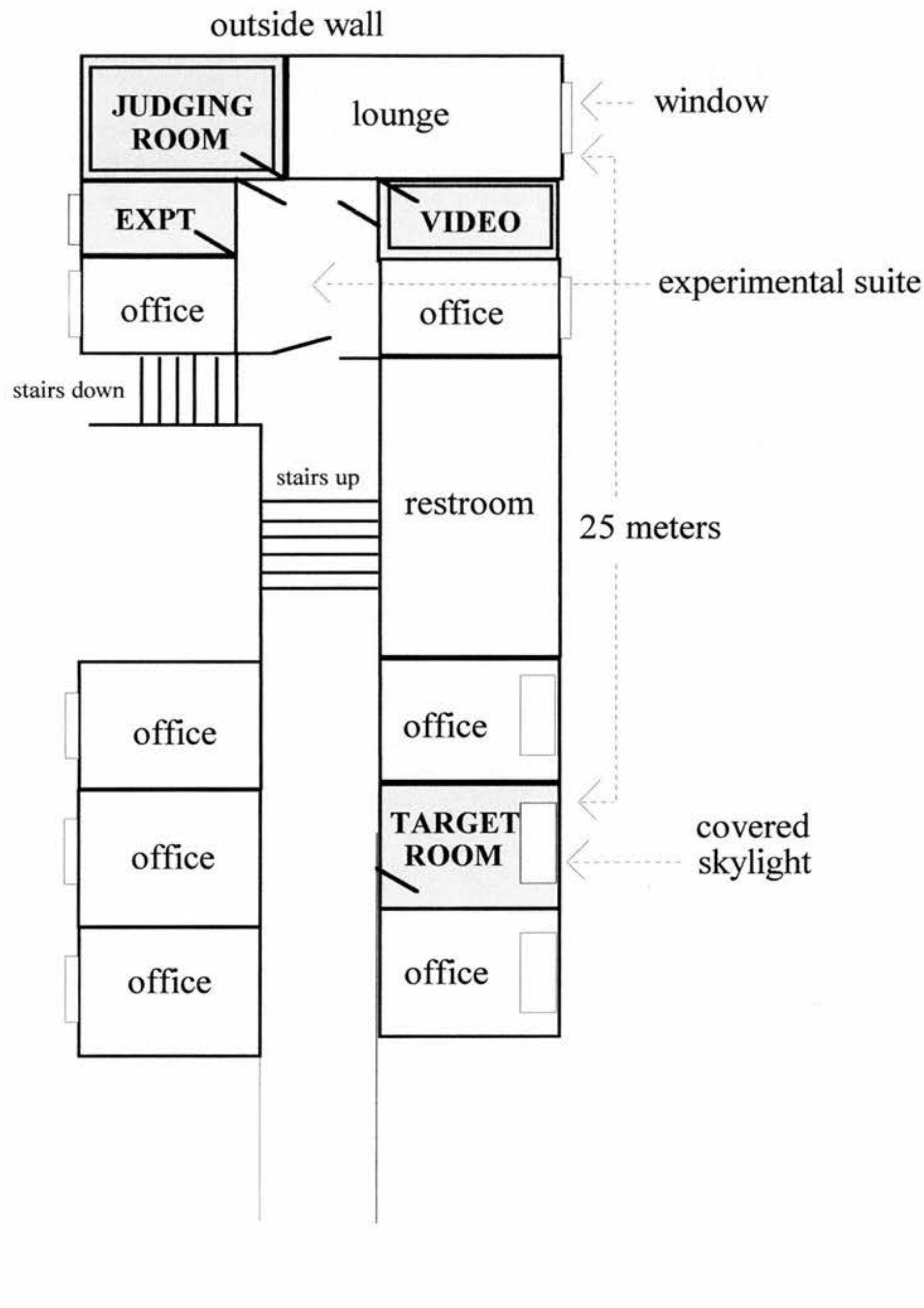
Van de Castle, R. L. (1977). Sleep and dreams. In B. Wolman (Ed.) *Handbook of Parapsychology*, 473 - 499. Jefferson, North Carolina: McFarland & Company, Inc.

Wilkinson, H. P. and Gauld, A. (1993). Geomagnetism and anomalous experiences, 1968-1980. *Proceedings of the Society for Psychical Research*, **57**, part 217, 275 - 310.

Appendix 1

KOESTLER CHAIR

LABORATORY LAYOUT FOR DREAM STUDY



ACKNOWLEDGEMENTS:

We would like to thank Dr. Caroline Watt for her assistance in this study as data storer, and both Prof. Robert Morris and Dr. Watt for their helpful suggestions on an earlier draft of this paper. The Economic and Social Research Council is acknowledged for their financial support of Simon Sherwood, the Institut fuer Grenzgebiete der Psychologie und Psychohygiene for their support of Fiona Steinkamp, and the Society for Psychical Research for their support of Kathy Dalton.